

COMPUTER TACTILE GRAPHICS FOR TEACHERS

USING MICROSOFT® WORD'S DRAW COMMANDS TO CREATE BRAILLE GRAPHS

**December 6, 2013
FIMC-VI**

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**Please make sure you put the words
"braille" or "graphics" in the Subject line
so that I know it's not Spam mail.**

**904-725-2427
(Please leave a message
when my husband's voice tells you.
I'll get back with you as soon as possible.
We screen our calls.)**

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PART I

HAVE FUN WITH COMPUTER GRAPHICS

Come have fun drawing computer illustrations using Microsoft Word's Draw function. We will work with shapes, lines, "textures", copying and pasting, moving, saving, edit points, etc. These computer braille graphics use the TIE (Tactile Image Enhancer). Bring your laptop and join in the fun.

Some of my suggestions differ from my previous "Can't Draw? Use Computer Graphics!" workshop because of further research and consultation with graphics experts. Lead lines are dashed instead of solid, etc.

BASIC GRAPHIC RULES

Before using the computer and/or scanner to produce braille graphics, learn some basic graphic rules and hints.

Some graphics are more suited to collage or foil production. Early grades, anatomy, etc. where differences between texture, location, size, etc. is important are better suited to collage or foil. Shells would be better done in foil so that you could feel each indentation and curve to differentiate between shells. Computer graphics do not represent 3-D effects well. Using overlapping sequins to replicate fish scales feels more truer to life than drawn individual scales.

Remember also that some illustrations simply should not or cannot be reproduced. If the information is already stated in the text, don't reproduce the graphic unless the teacher desires it or unless reading graphics is being taught such as in a test or a class teaching graphs, charts, maps, and so on. Some illustrations are too detailed or confusing that they cannot be simplified or reproduced even using more than one braille page.

3-D illustrations should be reproduced in 2-D instead. Usually you could just show the side view. If you need to show something like a cube, show it in 3-D. Inside lines should be dashed. You could also show it opened up like an unfolded carton.

Graphics should be orientated toward the left side of the paper instead of centered. This allows the reader to find it easier and to allow labels on the right side. Computer graphics are produced in layers. Use **Order** on the **Draw Menu** if your layers get confused. Try to figure out which layer goes first before starting.

No Fill means that the shape is transparent so that you can see the graphic layer(s) beneath the one marked **No Fill**.

NOTE

These instructions are for graphics embossed on the ViewPlus "Tiger" embosser. If you need your graphic to be produced using the microcapsule "puff" paper, change the margins to left: 1.0, top: 0.6, and bottom and right: 0.5. The font should be Braille Puffdots size 24. The line spacing should be exactly 26 pt. See the appendices for other font suggestions.

THANKS

Guidelines for Mathematical Diagrams, and its supplement, published by **BANA** (Braille Authority of North America), is one of the best places to start. Another is the Tactile Graphics Guidebook by **APH** (American Printing House). Both have critiqued examples along with basic suggestions and explanations. They explain placement, labeling, etc.

Ruth Jean Ostle's **VAVF** (Visual Aid Volunteers of Florida, Inc.) Conference workshops are invaluable in learning what to include or not include, how to arrange it, how to label the graphic, etc.

Much of this manual comes from Doris and Pete Schuyler's computer graphics workshops at past **VAVF** Conferences. Part of the scanning section comes from Janet Nullet's scanning workshops.

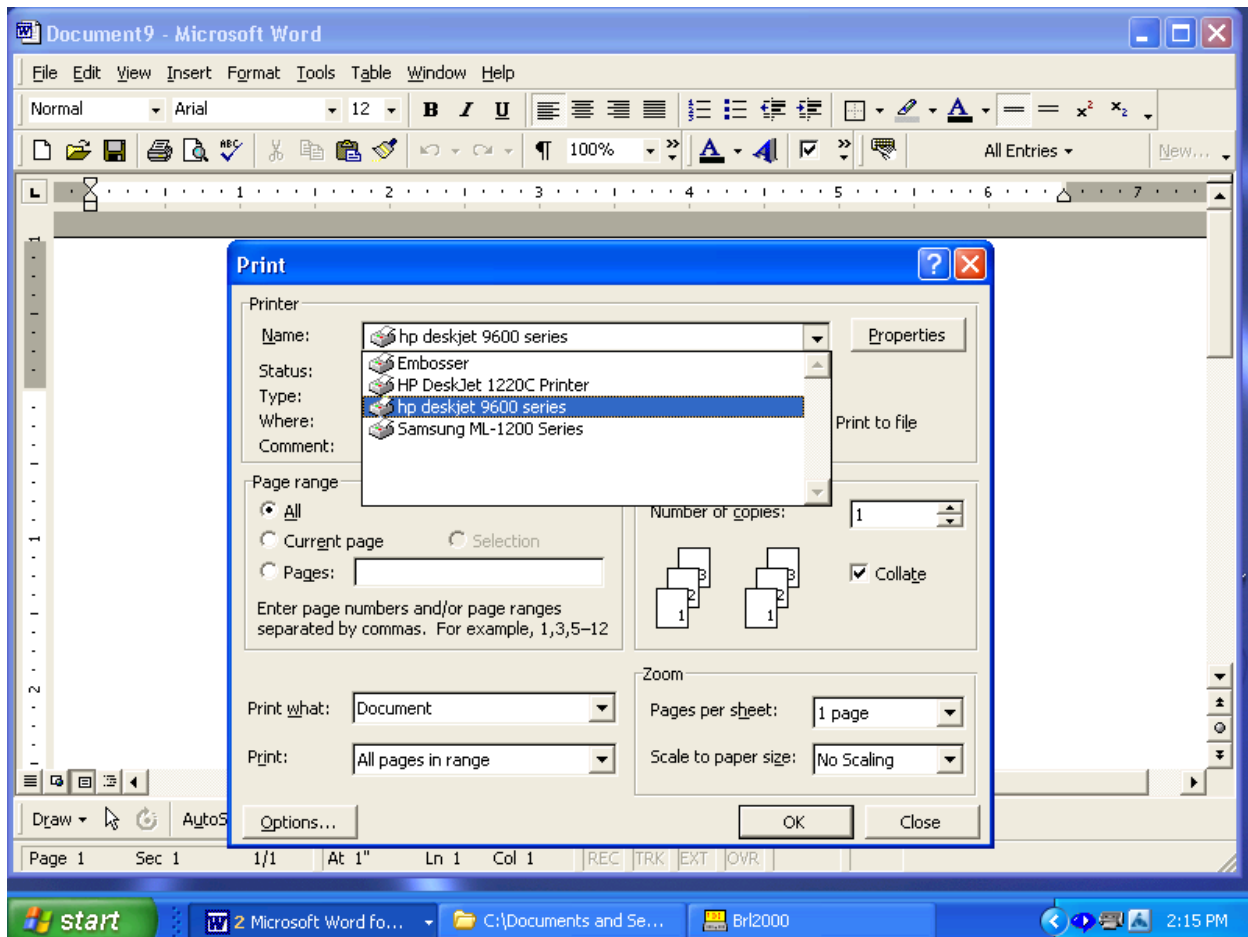
Thank goodness Pat Gray shares any new computer and graphic information she discovers since I use much of the same information with as she does with her maps.

The information about the Braille29 font was from "Tiger Tactiles Using Microsoft Word" at the 2009 California Conference. It was presented by Peggy Schuetz and Bob Walling from the Transcribing Mariners, and Art Benitez from American Braille.

NBA (National Braille Authority, Inc.) has numerous workshop publications about producing different types of braille graphics. These publications can be purchased directly from **NBA**.

Some of the information in this manual is based on and developed from information published in the LTS Online Help Collection (www.uwec.edu/help) developed by the University of Wisconsin-Eau Claire and copyrighted by the University of Wisconsin Board of Regents. Used by permission. www.uwec.edu/Help/Office03 and www.uwec.edu/Help/Office07.

PRINTER SETUP OF GRAPHIC PAGES

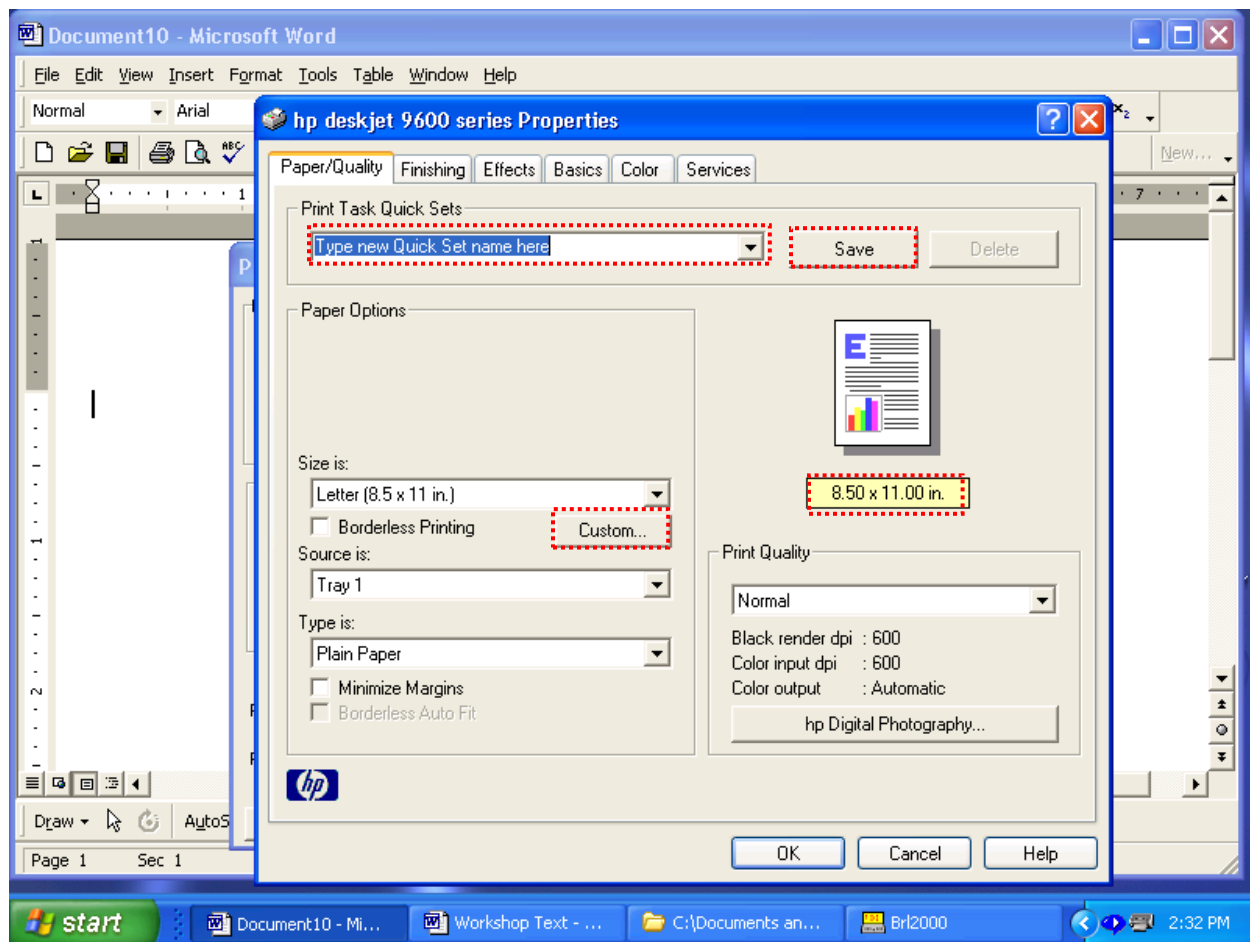


If you do not have a large carriage printer, see if you can install the HP 9800 printer on the included CD. If not, try to download the driver from the internet from the HP website.

If you do have a large carriage printer, make the following changes:

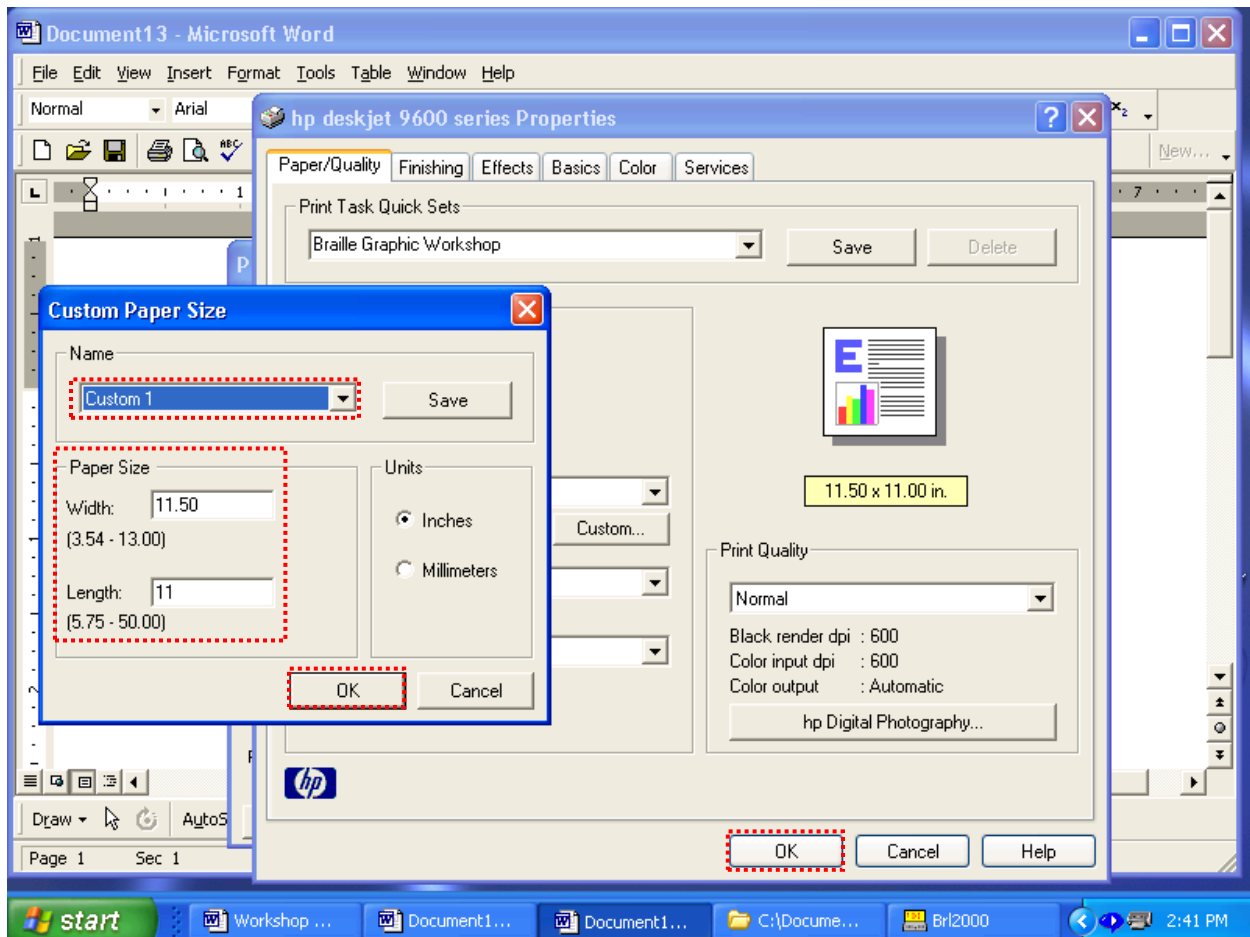
1. Click on File/Print so you can change the Printer Name: (name of your printer).
Mine is the hp deskjet 9800 series.
2. Click on Properties.

CHANGING PRINTER PROPERTIES TO 11.5 X 11 INCH SIZE



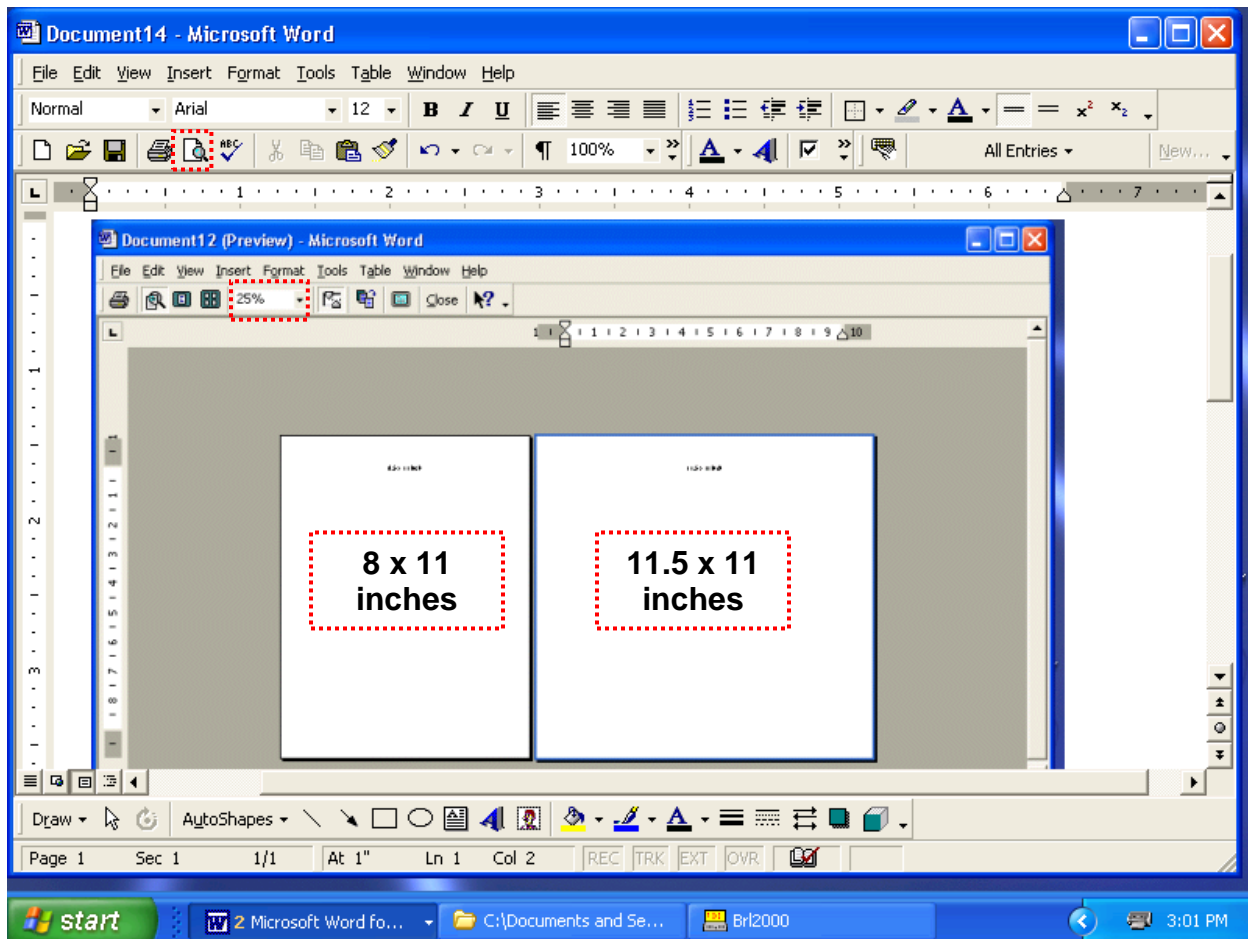
1. My large carriage printer allows me to set up a QuickSet Name so that all I have to do is choose that name when I begin working on a new graphics page and the printer is set to 11.5 x 11 inch paper without me going through all the steps each time. Some printers use the name "Custom" or something similar.
2. Type another name for the QuickSet name: Braille Graphic Page 11.5 x 11.
3. Save the new QuickSet name by clicking on the Save button in the red box to the right of the name.
3. See the size in the red box? It needs to be changed to 11.5 x 11 inches.
4. Click on Custom button. This will bring up another menu.

CHANGING THE CUSTOM SIZE TO 11.5 x 11 INCHES






1. Type in the new measurements of Width: 11.5 and Length (or Height): 11.
2. Notice the Custom in the red box. You cannot change this name for this printer. Each time you change the Custom, the name will change from Custom1 to Custom 2, etc. automatically. Don't worry about this.
3. Click OK on the Custom Paper Size menu.
4. Make sure the size changed on the Properties menu before clicking this OK.
5. **Do Not Click on OK again.** You will print an empty sheet. Click on Close instead.

PRINT SCREEN TO SEE WHAT YOU HAVE



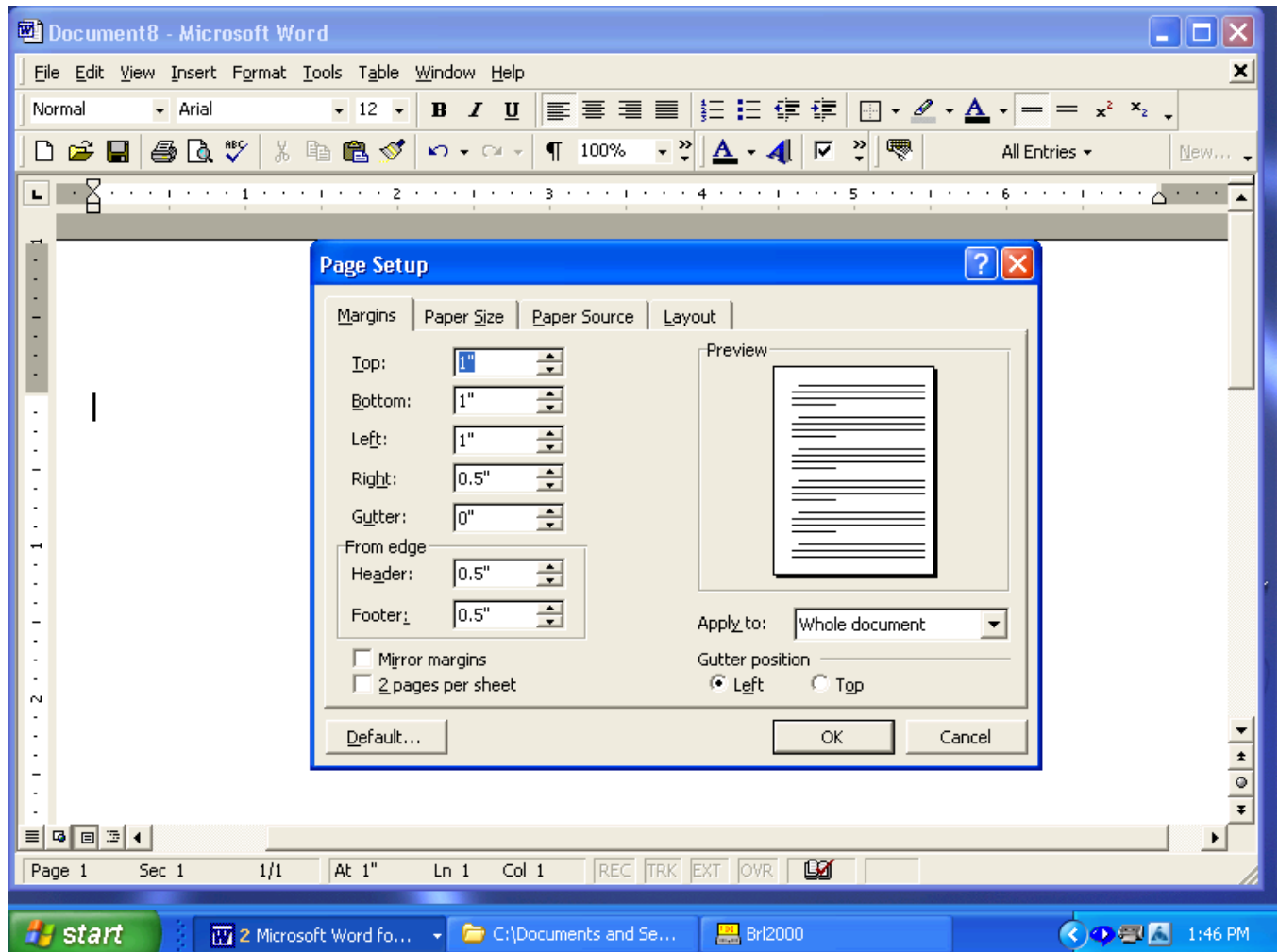
1. See the red box around the page with a magnifier icon? The red box is around the Print Preview icon. You can click on it to see what your whole page looks like or maybe two consecutive pages look like. (Not the page with the turned corner without the red box. That one is the New Page icon.)
2. See the 25% in the red box? You can change the size of the image of the page here. 25% usually lets you see 2-3 pages at a time.
3. Only put one graphic to a file unless it will take more than one page to complete the whole graphic with its key, if any. When you make adjustments to the first graphic, you will not inadvertently mess up the next. Make sure your filename has the consecutive page number—265, 265A for a265, 265B for b265—in the filename, but use 265A, etc. to keep the pages in order. 786B Women in the Workforce bar graph would be a good name for the bar graph on page b786 entitled Women in the Workforce containing a bar graph and would be put into a folder named after the title of the book the graph was in.
4. Press the **Esc** key (Escape key) to toggle back to your regular page.

MAKING A MICROSOFT® WORD GRAPHIC TEMPLATE

1. **File / Page Setup / Paper Size / Width:** 11.5" Height: 11"
2. **File / Margins / Orientation** Portrait
2. **File / Page Setup / Margins / Top, Bottom & Left:** 1", Right: 0.5"
3. **Format / Font / Braille29** .: ::· ·:· ·:· ·:· ·:· ·:· , (For ViewPlus embosser, font size 29. You manually type the font size as 29. It is not a choice. Hit ENTER or it will not work!)
4. **Format / Paragraph / Line Spacing:** Exactly at 25
5. Make sure you have your ruler across the top and sides of your screen. To add the ruler, go to **View** and click **Ruler**. You may have to do it twice to get both top and side rulers.
6. Draw a line. Change it to 2.5 or 3 points. 
7. **Draw / Set AutoShape default**
8. Draw an arrow. Change it to 2.5 or 3 points. Choose either largest closed 3-point or open 3-point style.  
9. **Draw / Set AutoShape default**
10. Delete line and arrow
11. **Save as / Save As Type: Template** (.dot). Filename: either Tiger Graphic Page 11.5 x 11 or Puff Microcapsule 11.5 x 11 depending on which font and font size you use. If you can't get this to work, just Save As a Word 1997-2003 Document.
12. **IMPORTANT!** Close file before using it!
13. **File / New / Graphic Page** to use it AFTER saving it under a different name.
14. When you go to emboss, make sure your embosser and file are both set to the 11.5 x 11" portrait oriented braille page or text and/or part of the graphic will be lost.

**** Always save your graphic files under the Word 1997-2003 Document format because some of the later versions of Word do not have all of the draw commands that are needed. ****

SETTING MARGINS



For Puff Microcapsule Paper

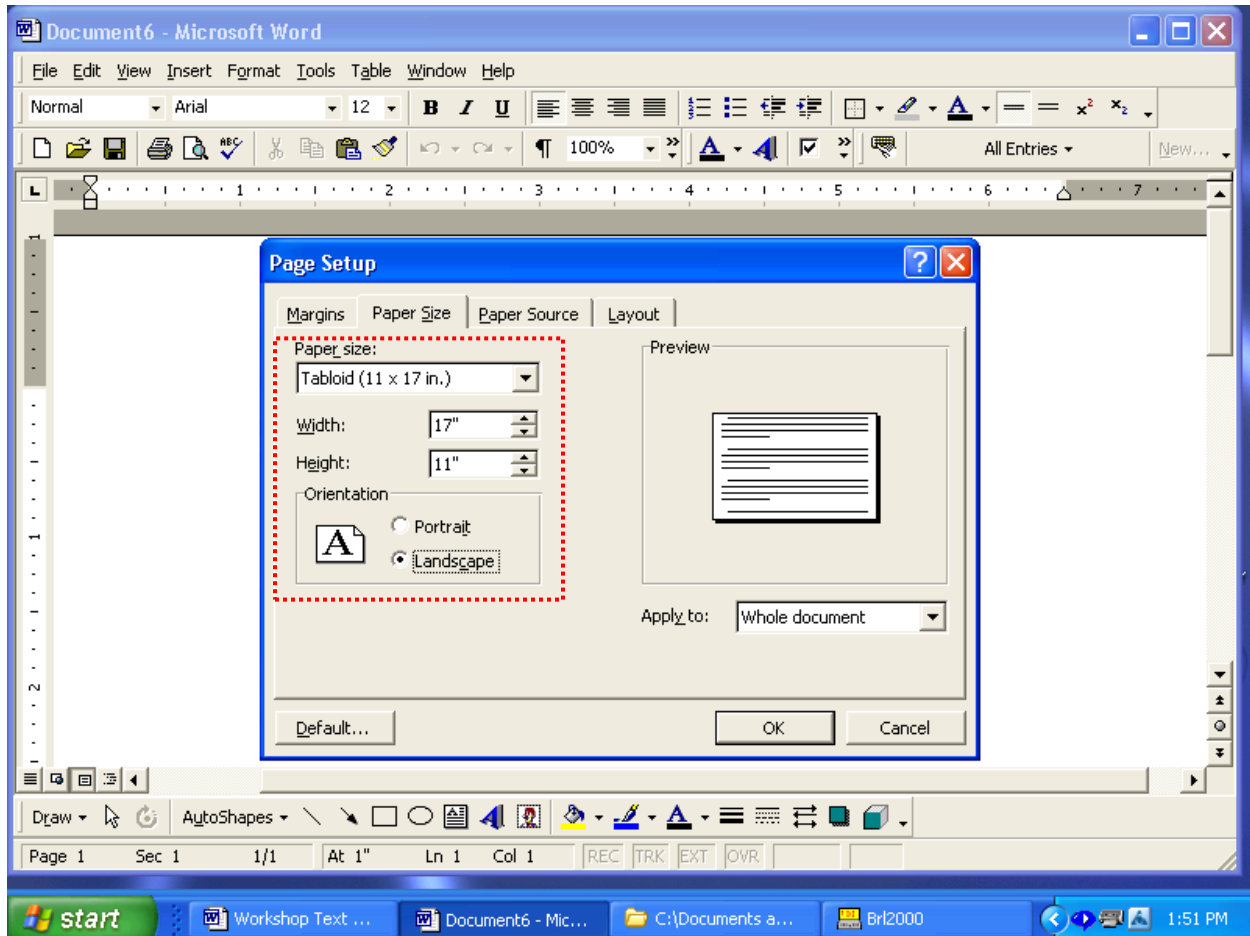
1. Open Microsoft Word 2000.
2. Click on File/Page Setup to get the Page Setup menu above.
3. Click on the Margins tab and change the Right Margin to 0.5 (that's point 5).

OR

For Tiger Embossed Graphics

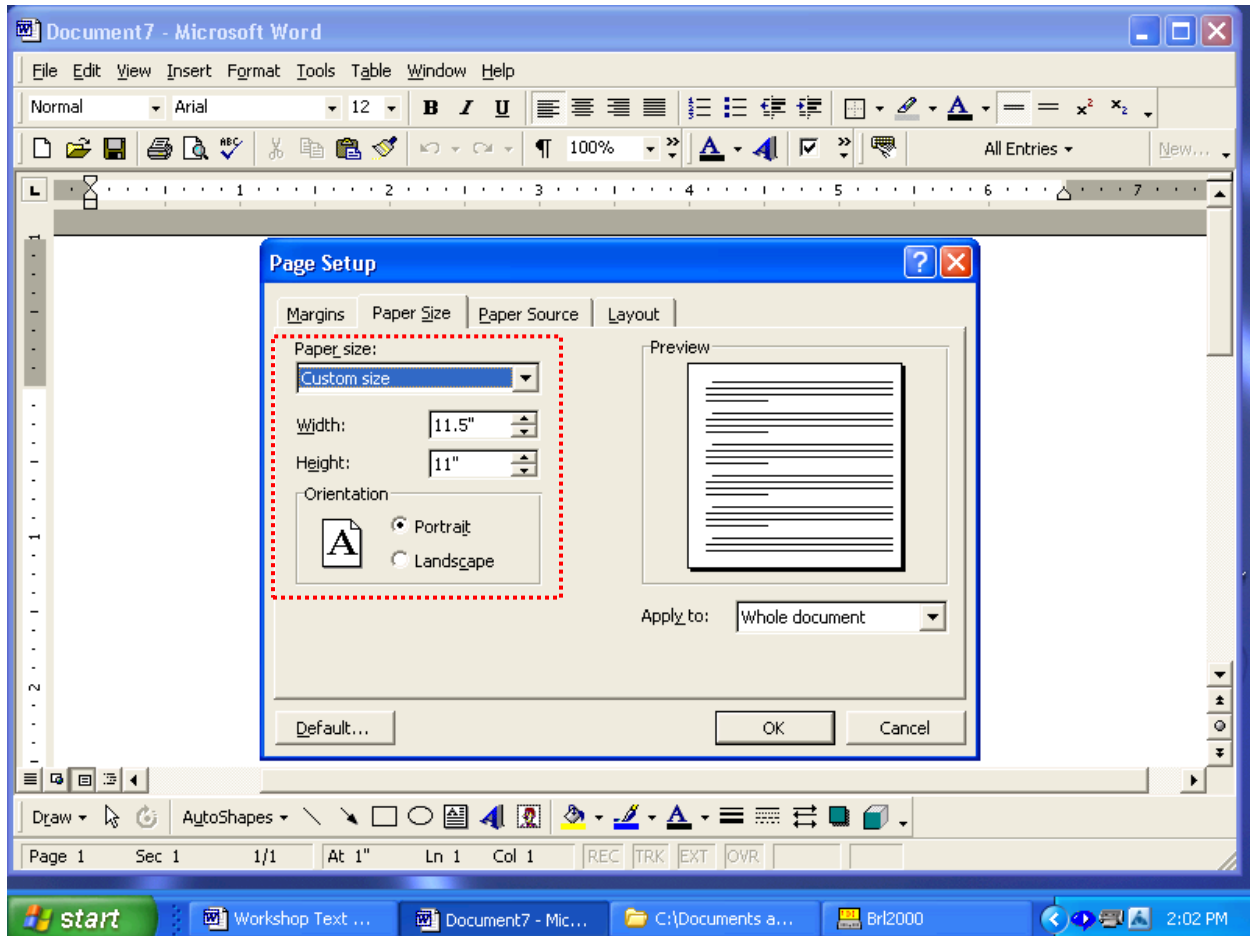
1. Open Word 2007.
2. Click on Page Layout tab and choose Margins: Left 1, Top 0.6, Bottom and Right 0.5.

SETTING PAGE SIZE IF YOU DO NOT HAVE A LARGE CARRIAGE PRINTER



1. Click on Paper Size tab.
2. Click on the down arrow besides the Paper Size: Letter size and you will see the Tabloid (11 x 17 in.) Notice Width is 11 and the Height is 17 and Orientation is marked Portrait.
3. Click on Orientation: Landscape. Notice that now the Width is 17, Height is 11, and Orientation is Landscape. Width is always given first--Braille paper is 11.5 x 11".
4. Now click OK to set the changes on both the Margins and Paper Size tabs at one time.

SETTING PAGE SIZE IF YOU DO HAVE A LARGE CARRIAGE PRINTER



1. Click on Paper Size tab.
2. Click on the down arrow beside the Paper Size: Letter size and you will see the Custom size choice. Click on Custom size. Notice Width is 8.5 and the Height is 11 and Orientation is marked Portrait.
3. Change the margins to Width: 11.5, Height: 11, and leave Orientation: Portrait. See above.
4. Now click OK to set the changes on both the Margins and Paper Size tabs at one time.

MOVING IN MICROSOFT WORD®

Ctrl-a means hold down the Ctrl (Control) key while pressing the letter **a** key.

Shift-F3 means hold down the Shift key while pressing the F3 (Function 3) key.

End moves the cursor to the end of the line.

Ctrl-End moves the cursor to the end of the file.

Home moves the cursor to the first of the line.

Ctrl-Home moves the cursor to the first of the file.

Directional Arrows are the 4 keys that point in up, down, left, and right. They move space by space in whichever direction that arrow points.

Ctrl-Right Directional Arrow moves the cursor right one word at a time.

Ctrl-Left Directional Arrow moves the cursor left one word at a time.

Ctrl-Up or Ctrl-Down Directional Arrows move the cursor up or down one line at a time.

Shift-Left and Right Directional Arrows highlights one space or cell in whichever direction the arrow is pointing.

Shift-Up and Down Directional Arrows highlights one line from the cursor in whichever direction the arrow is pointing.

Shift-End highlights from wherever the cursor was last clicked to the end of the line.

Ctrl-Shift-End highlights from the cursor to the end of the file.

Shift-Home highlights from the cursor to the first of the line.

Ctrl-Shift-Home highlights from the cursor to the first of the file.

Ctrl-a highlights all of the file.

Ctrl-c copies whatever is highlighted to the clipboard.

Ctrl-v pastes or moves the highlighted text from the clipboard to wherever you clicked your cursor last.

Ctrl-x cuts the highlighted text. Pressing the **Delete** key does the same.

Ctrl-d duplicates whatever line, shape, etc. that is "active" (Small squares show at each corner and middle of each side.)

Delete key deletes one space or cell at a time from the right.

Backspace key deletes one space or cell at a time to the left.

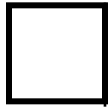
Ctrl-p sends the file to the printer usually.

Shift-F3 changes highlighted text from no capitalization, to all letters capitalized, to only the first letter in the word(s) capitalized continuously as long as you press **Shift-F3**.

This one does not work in Braille2000.

MOVING AROUND LINES, AUTOSHAPES, AND TEXTBOXES

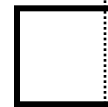
Your line, AutoShape, or textbox must be selected (show with small squares around its perimeter) before you can move it or cause any change.



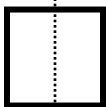
Original location



Can hardly see the difference. Nudged one pixel using **Ctrl** plus the **Right Directional Arrow**. Can also use **Draw / Nudge / direction**.



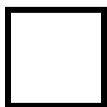
Moved 3 pixels using **Ctrl** plus the **Right Directional Arrow**. Still can hardly see change.



Moved 5 pixels by pressing the **Right Directional Arrow**.

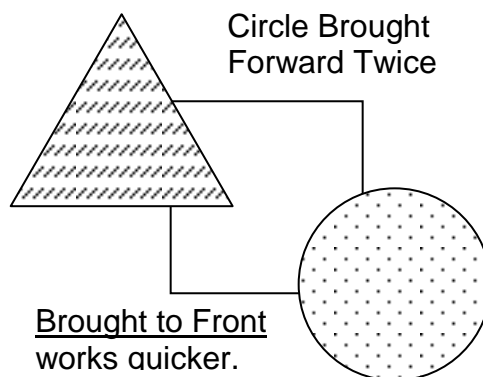
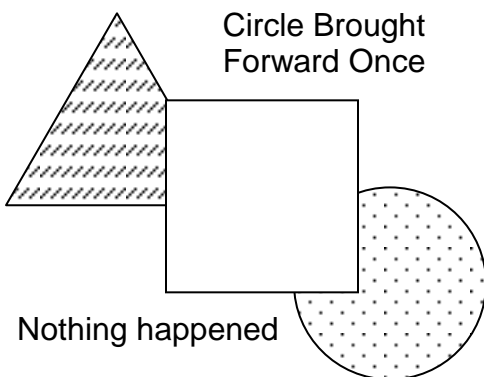
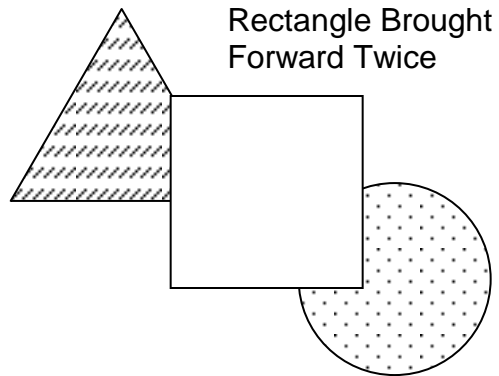
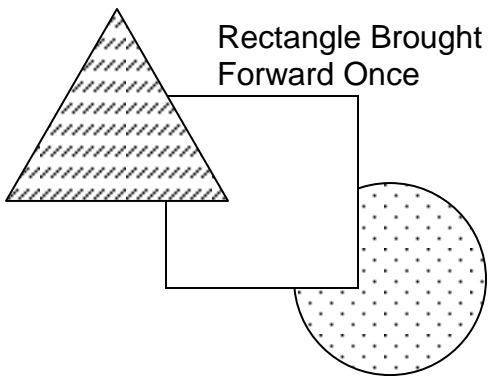
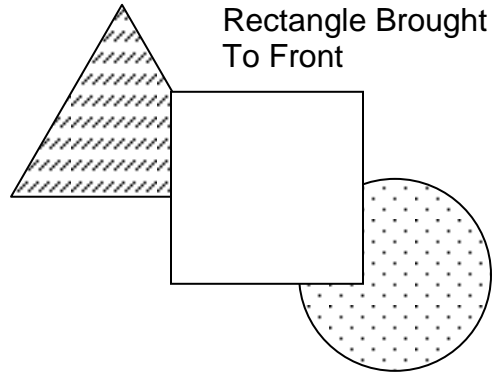
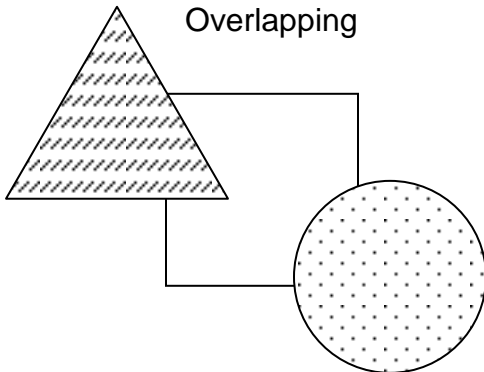
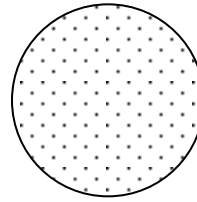
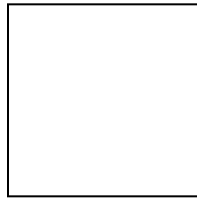
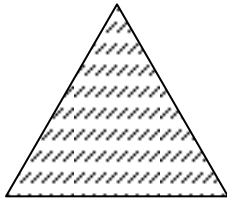


Dragged here.

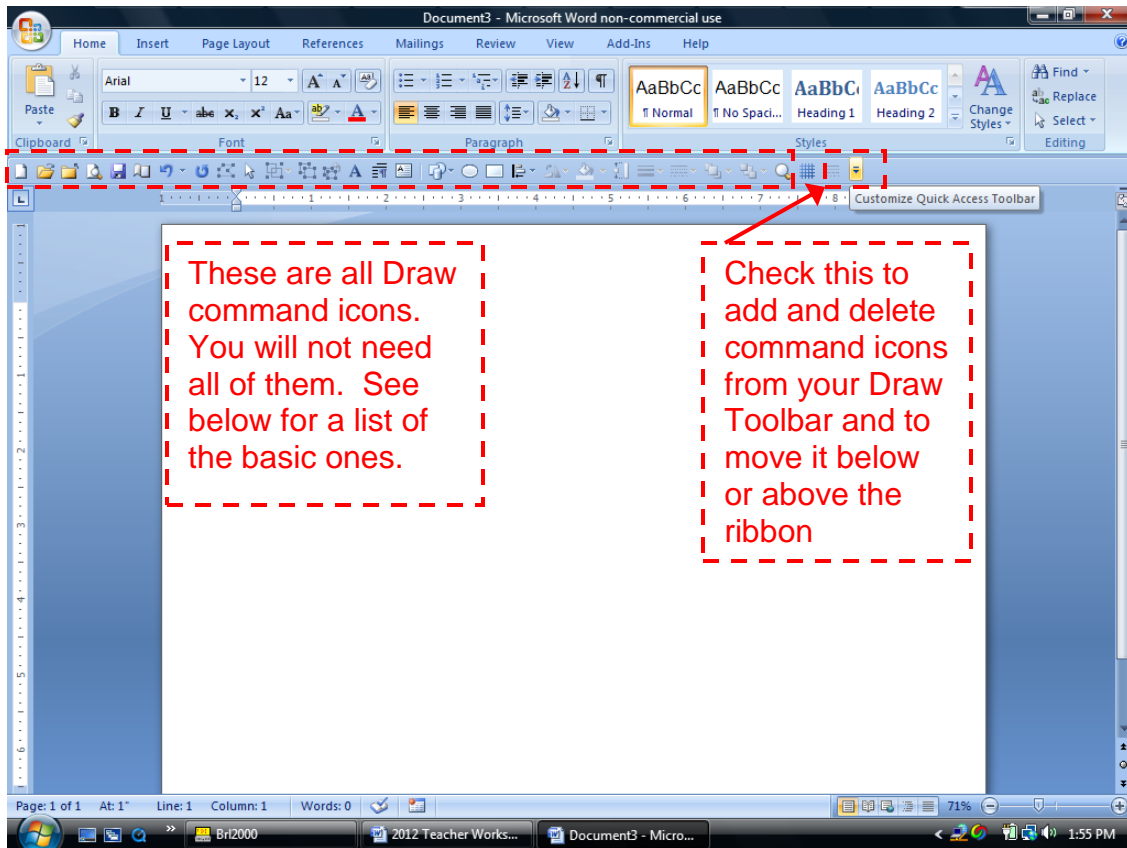


Dragged here.

ORDER



DRAW TOOLBAR



1. Click on the Customize Quick Access Toolbar icon and choose Show Below Ribbon.
2. Click on Customize ... again and choose More Commands.
3. Change Choose Commands From to All Commands.
4. Add the following to the toolbar: Align ▼, Bring to Front, Draw Textbox, Edit Points, Group ▼, Print Preview, Redo, Rotate, Save, Select Drawing Objects, Send to Back, Shapes ▼, Undo, and Zoom. These are alphabetical in the listing. You can change the order later by dragging and dropping in the list to the right. Don't forget to OK.
5. Now you have your Draw Toolbar to use.

DISTANCES AND LENGTHS AND SIZE

Margins

Margins should be 1" on the left, top, and bottom and 1/2" on the right. FIMC prefers 1" on most sides for ease of copying, especially thermoform. It's easier to use the same margins for everything instead of switching back and forth.

Braille Cells

Braille cells are approximately 1/4" high and 1/8" wide. Spaces between braille cells are approximately 3/32". Space between lines is about 5/32".

Lines

Primary lines (most important lines) should be roughest (jagged, dashed, etc.) These should be at least 1/2" long. Each dash of a dashed line should be between 1/4—3/8" long with the spaces between dashes 1/8—3/16".

Secondary lines should be smoother.

Line segments should be at least 1/2" long. (Longer for coarser lines)

Secondary lines such as graph tick marks, clock face indicator marks, number lines, dashes, etc. should be 1/2" long split with 1/4" on each side.

Two lines should be at least 3/32" or 3 mm apart. This is the difference between two adjoining braille cells.

Grid lines should be lightest in the graphic except for lead lines. They should be at least 3/8" apart.

Lead lines (lines leading from the label to the diagram) should be used only when absolutely necessary. Try to put your labels on or close by whatever they label.

Point Symbols

Points (oversized dots or shapes) should be at least 1/4" in diameter.

Hollow point symbols are better than solid.

Circles and squares are the easiest points to recognize.

If needed, use hollow circles, squares, etc. as points on lines in line graphs. Solid points cause problems with copying and they're harder to differentiate.



FONTS FOR PUFF MICROCAPSULE PAPER

If you are using a regular or large carriage print embosser, you will need the Braille2000 PuffDots font. If you have the Braille2000 program, you have the BraillePuffDots font. Otherwise, download the Braille2000 program from <http://www.c-a-s.com/brl2000>. Unless you have the launch USB device, you can only run the program in demo mode and not save your file. The font is installed on your computer automatically.

You can also use Duxbury braille font. See Appendices.

If you have a ViewPlus embosser, you need to use the Braille29 or Brl29 font. Download the font from **AmericanBraille.com** > tools to your Desktop. Then open the Control Panel > Fonts. Now click on Start > Control Panel > fonts. Drag and drop the font into the fonts folder and you are ready. You can also download it from the CD given you at this workshop. It will be in braille in the font list with dropped number 29.

TEXTBOX INFORMATION

Labels in text boxes are always horizontal, never vertical or slanted.

If you can fit the full label on the part of the graphic to which it refers, use the full name. If you cannot fit the full name, use abbreviations and a key.

Lead lines from the label to the graphic component can be straight horizontal, vertical, or slanted lines.

Most text boxes should have No Fill and No Line.

Text boxes with No Fill and No Line can overlap as long as you keep your braille text separated enough.

If your text box is on textured background, you will need a white colored fill to block the texture so that the print braille dots can be seen. There should be at least 1/8" open area around the text in a textbox and the black line around the textbox itself.

If your text box is on textured background, you will need a black border around the text so that the text box stands out.

Text boxes do not need to be in the exact place on your graphic as it is in print. Sometimes the text will not fit in that space.

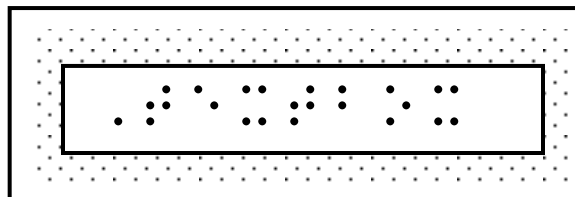
Text box labels may need **lead lines** to point from the text box to whatever it identifies.

DRAWING TEXTBOXES



No Line, No Fill

Usual Textbox

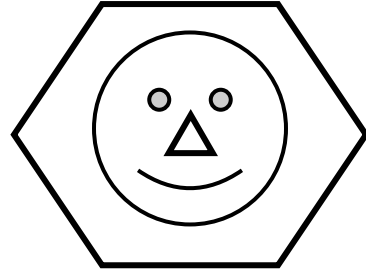
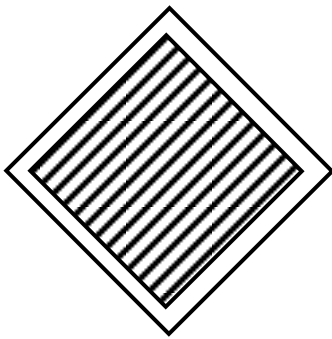


Black Line,
White Fill

Within Texture

1. Textboxes are used to label graphics and to add headings, page numbers, and text. Label your graphic after your graphic is otherwise finished. When you set up your graphics page template, you set defaults for the lines and arrows. **If you set a default for the textbox for your template, it will affect your lines which will become No Line, No Fill. Your graphic will be ruined!**
2. Either braille your label in Braille2000 and copy it before pasting it into the textbox or type in ASCII directly into the textbox. In ASCII, punctuation and numbers become the contractions such as ! equals "the" and "th" in braille; "4" equals "4" and the period; etc. There's an ASCII cheat sheet in this handout.
3. Click on **Textbox** icon on **Draw** Toolbar and click close to where you want it. Insert your braille or ASCII. Turn your ASCII into Braille2000 PuffDots font, size 24.
4. Either right-click on the textbox to get **Format/Textbox** and click on the **Size** tab to set the correct measurements or drag it to the approximate size. Do not click OK this first time because you also want to make the **Color and Lines** settings.
5. Click on **Color and Line** tab and choose **No Fill, No Line** under **Line Color** and **Fill Color**. Now click OK. Don't do this step if your textbox is within a textured area.
6. Click either **Draw/Set AutoShape Defaults** or right-click on textbox border and choose **Format/Set AutoShape Default**. (Right-click gets you many of the same choices that clicking on **Draw** does.) Now all your textboxes will have the **No Fill, No Line** default. You still have to insert the braille and adjust the size. Since you should save your Braille Graphic Page Template under a different name before doing anything else, this default will not affect your drawing.

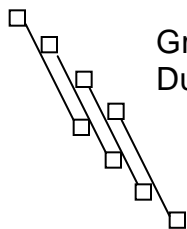
DRAWING SHAPES FROM DRAW TASKBAR OR AUTOSHAPES MENUS



Before you start your graphic, put in your headings, any necessary text, and page numbers. For bar graphs, also put in the left-hand and bottom labels so you'll see how much room you have for the graphic. You may have to copy some or all of the left-hand and bottom labels into textboxes later to better position them around the graphic.

You can put shapes around other objects to form a border or frame. They may also be used as squares, parts of other pictures, etc.

1. Click on the **Rectangle** or **Oval** icon and click in the approximate location where you want the rectangle or square. **OR**
1. Click on **AutoShapes** and choose a **Basic Shape, etc.** and click in the location where you want the shape.
2. Click on the border of the shape. Now click on one of the small squares along the shape's sides and corners and "drag" the shape to the size you want. **OR**
2. Right-click on the border and choose **Format AutoShape**, then the **Size** tab). Make sure **Lock Aspect Ratio** is checked if you want the shape size to be proportional.
3. Use **Line style** icon to change the weight (width) of the lines, or right-click the line and use **Format / AutoShape** to fine tune its characteristics.
4. Use **Draw / Rotate or Flip** to rotate shapes around. Some of the shapes have a small green circle or yellow diamond that may be dragged one way or another to change the angle, perspective, etc. of that shape.
5. Use **Align or Distribute** to line up groups of lines equal distance from each other.



Grouped
Duplicated lines



Align middle or
horizontally

Align bottom



LINES

Solid, dashed, and dotted lines are in order as easiest to follow. Others, such as dot-dash-dot, double, etc., are too confusing.

Thin lines should be dashed instead of solid because dashed is easier to follow.

0.75 pt dotted lines are good for inside grid lines.

0.75 pt dotted lines are good for lead lines from labels to identified object.

2 and 2.5 pt lines are good for braille graph border lines.

3 and 3.5 pt lines are good for the line graph lines showing measurement.

To Draw a Line

1. Click on the slanted **Line** icon on the **Draw Toolbar** to draw a straight line

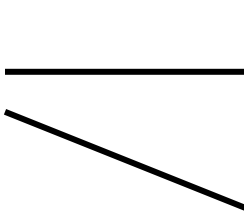
OR

1. Click on **AutoShapes**.

2. Click on **Lines**.

3. Choose any of the lines.

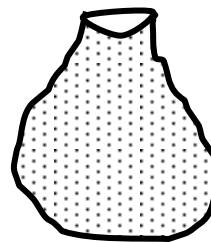
- Line** makes a "straight" line in any direction. To make it truly straight, hold down the **Shift** key while dragging the cursor in any direction. Let go of mouse button to stop drawing.
- Curved** makes curves (or straight if holding down the **Shift** while dragging the cursor). Click your mouse button whenever changing direction even a little. Double-click the mouse button to stop drawing.
- Freeform** lines go every which way without clicking your mouse button. Just drag the cursor in any direction. Double-click the mouse button to stop drawing. You can fill a closed in freeform shape with texture or color.
- Scribble** lines go every which way. Seldom used in braille graphics. Let go of mouse button to stop drawing.



Line



Curved



Freeform

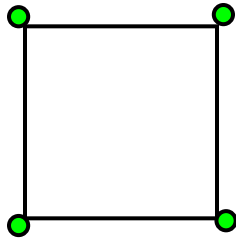


Scribble

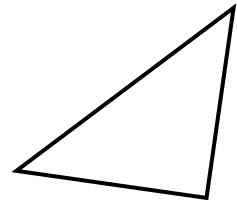
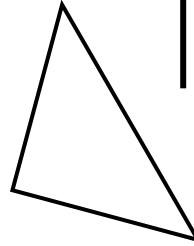
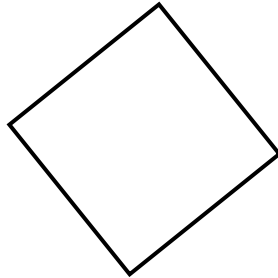
4. Use **Edit Points** to change your line in any way.

ROTATE

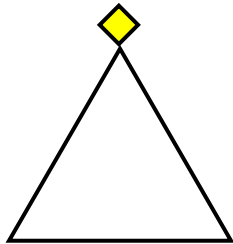
Click on shape or line to make it active. Click on **Draw / Rotate** and choose which direction you want. **Free Rotate** allows smaller increments of rotation. Holding down the **Shift** key while using **Free Rotate** moves 15° increments.



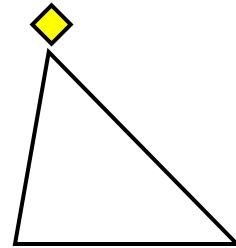
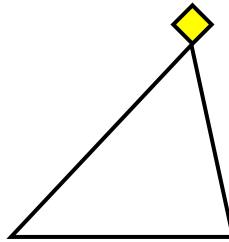
Free Rotate



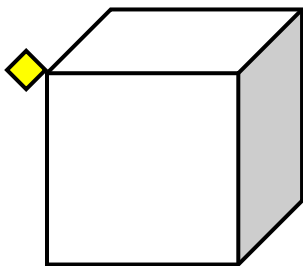
Rotated by pulling or pushing green circles with or without Shift key.



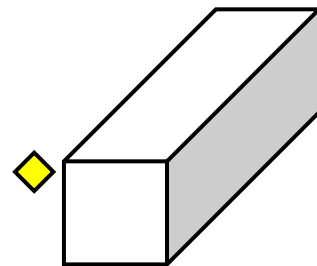
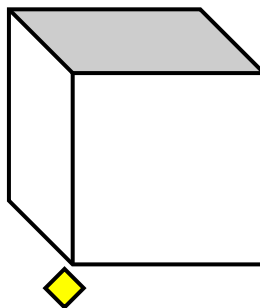
Basic
AutoShape
Triangle



Rotated by pulling or pushing yellow diamond.

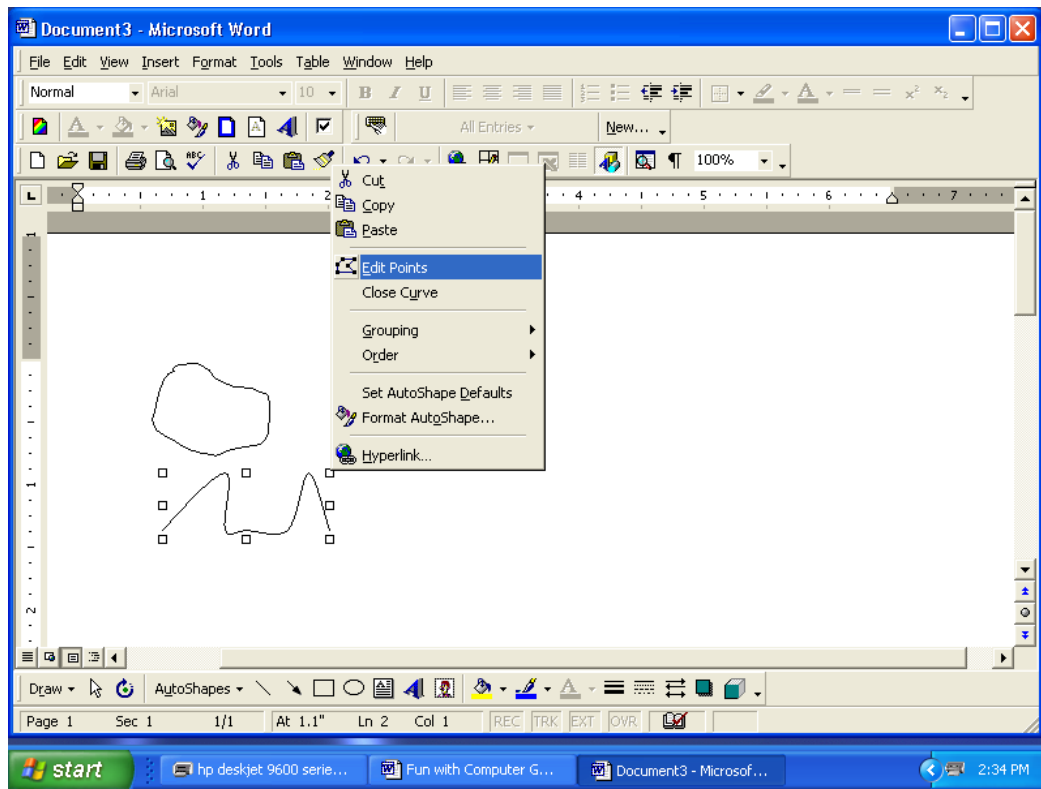


Basic
Shape
Cube



Rotated by pulling or pushing yellow diamond.

EDIT POINTS



You cannot use **Edit Points** on any AutoShape. You can use **Edit Points** on shapes you have drawn with lines.

Depending on if you click on the lines or resulting points while the small black dots (points) mark your line or shape, you will get different menus related to either points or lines.

You may add needed points and delete unnecessary points to change shapes.

To delete multiple points quickly, hold down the **Ctrl** key while clicking each unwanted point. Your cursor becomes an **X**. Click to delete that point quickly.

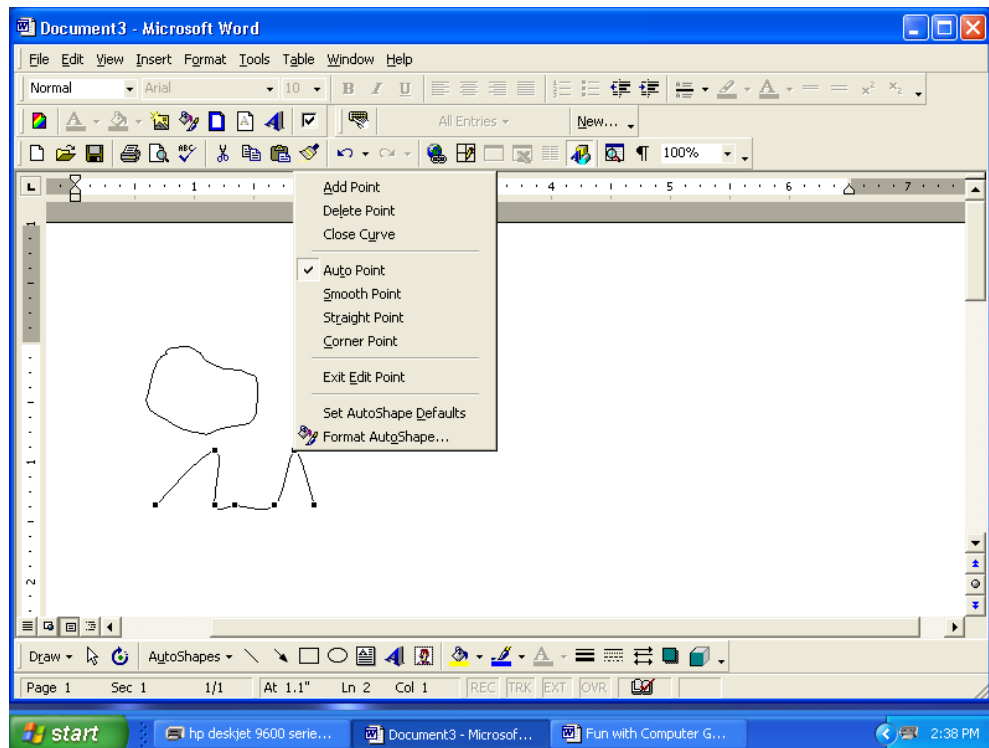
Close Curve will close any shape by joining both end points with a straight line.

A blue line with a small square at each end shows up when you choose a type of point. Move each square to shape the area around that point—smooth, straight, and corner.

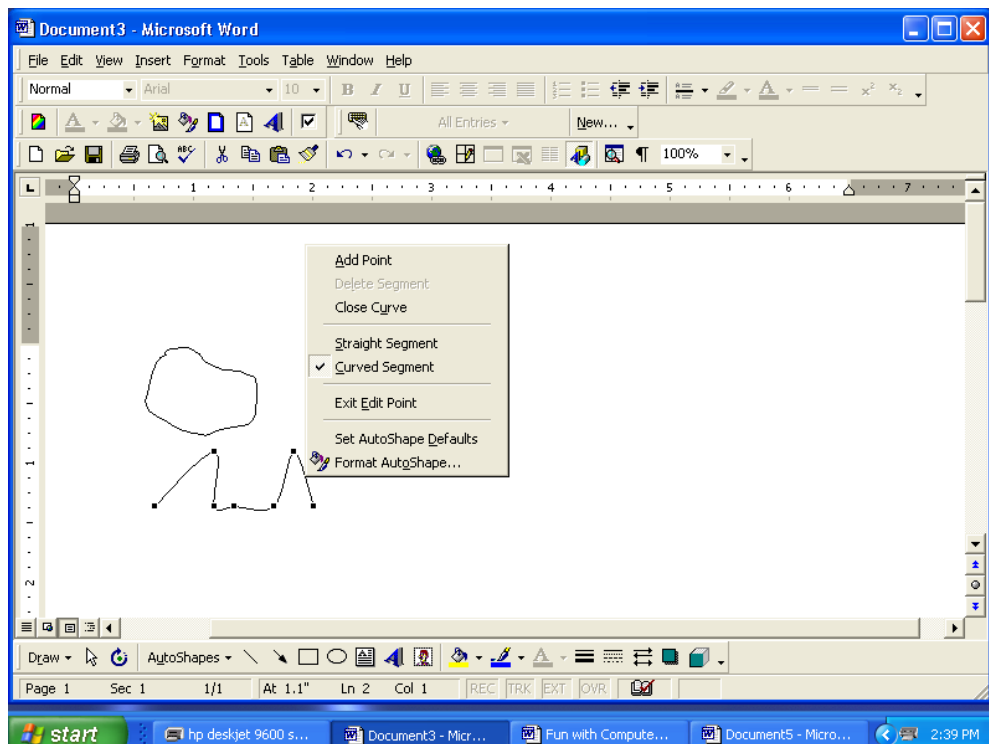
Clicking on a line segment allows you to change from a straight line to a curved line and back again.

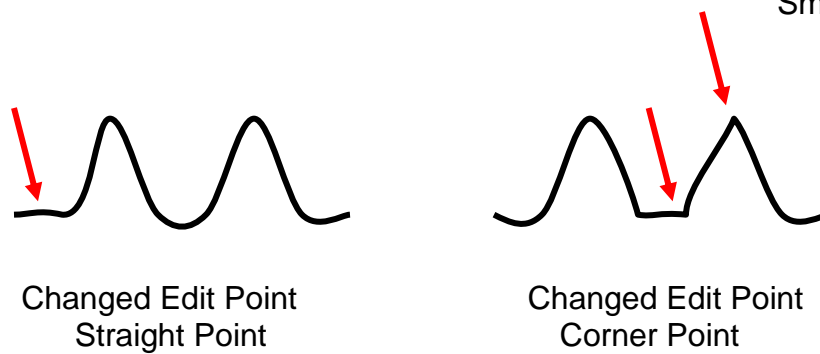
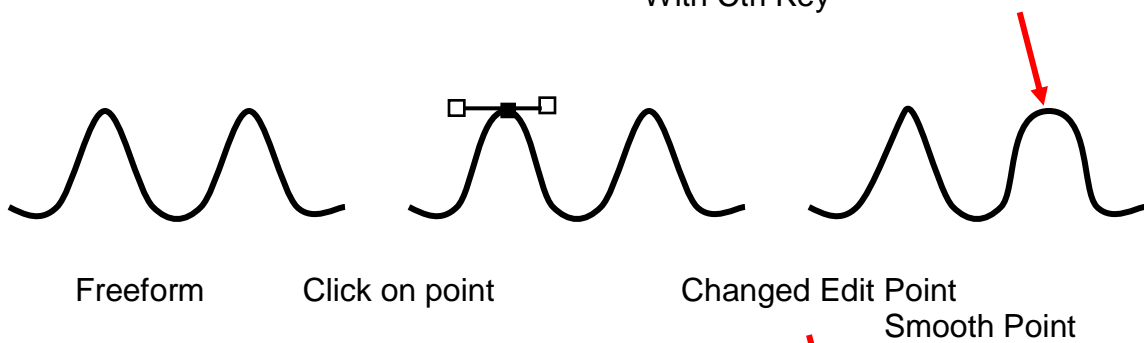
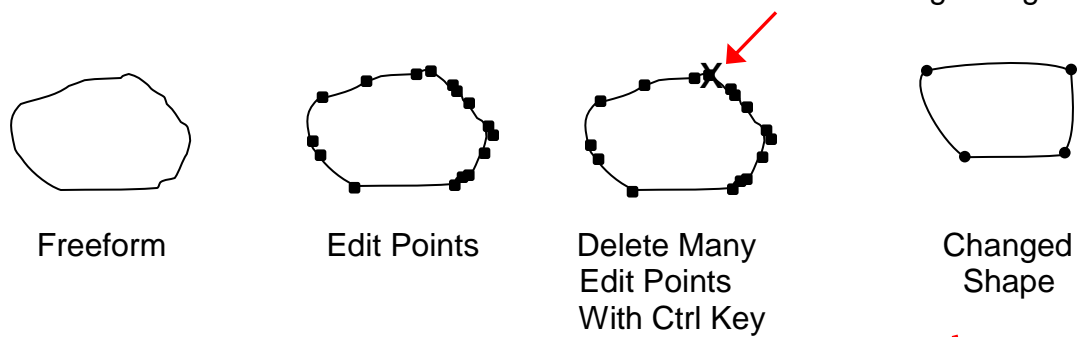
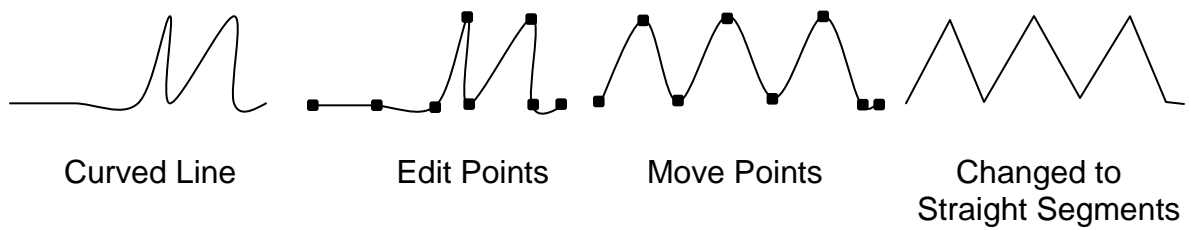
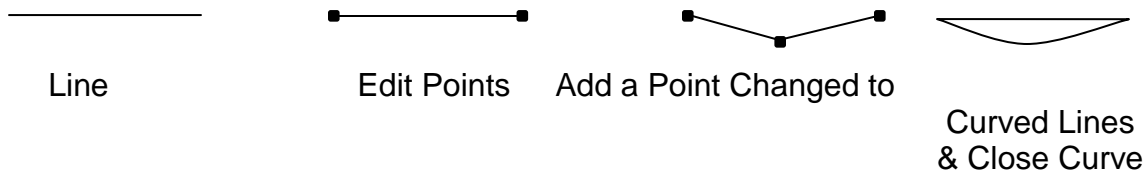
Use **Edit Points** to place the ends of your line exactly making it longer or shorter as needed. Drag the ends to where you need them.

EDIT POINT: POINTS OR LINES MENUS



EDIT POINT: LINE SEGMENTS





FILL TEXTURED AND UNTEXTURED AREAS

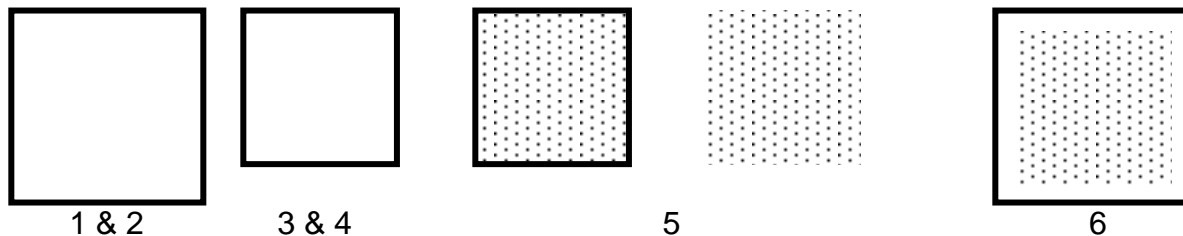
To make it easier for the blind person to locate different parts of a graphic, "texture" is sometimes added to a graphic. Microsoft Word **Fill Color** calls it a pattern, not texture.

All areas, textured or not, should be at least 1/4" square.

All textures have to be identified in a key in a 1/2" by 1" rectangle. Textures go first in the key.

Same as in lines and points, the more important textured area should be the heavier, rougher texture. It does not matter the type of texture if there's only one texture.

It is best to leave 1/16" between the texture and the line around it to make it easier to feel the line. This is especially good if you absolutely have to include texture in a pie chart or possibly a map.



1. Draw your shape or object or choose one of the **AutoShapes**.
2. Make it the correct size by right clicking on its border and choosing **Format AutoShape** or **Format Object** or whatever. Then choose the **Size** tab. Click **Lock Aspect Ratio** to keep the shape before changing the size. Change the size.
3. Duplicate your shape.
4. Repeat Step 2. Change the size to 2/10th smaller. (2 clicks down) 1.0" becomes .8".
5. Choose the **Fill Color** paint bucket icon on the **Draw Toolbar**. Click on **Fill Effects**. Then **Pattern** (not Texture). Choose a simple black or gray pattern. **OR**
5. Choose **Color and Lines** on the **Format AutoShape** menu.
 - A. **Fill Color:** Make sure black or one of the grays is chosen. Click on **Fill Effects**. Then **Pattern** (not Texture). Choose a simple pattern. Solids should always be gray instead of black because the Tactile Image Enhancer (TIE) regulates to the darkest color first. A solid black area would likely make the braille text too light to feel. The solid black sometimes "scabs" from absorbing so much heat. Yuck!
 - B. **Line Color:** Choose **No Color, OK**.
6. Use the **Directional** keys or "drag" the smaller shape into the larger. See the white border around the texture?

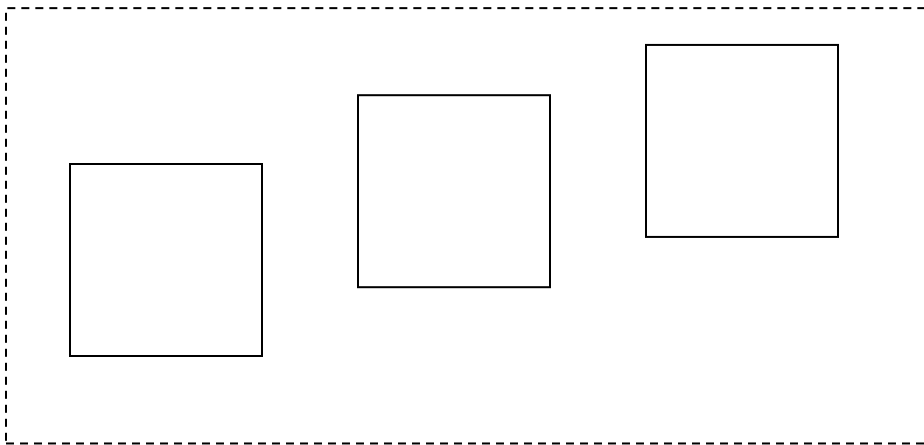
GROUP

Grouping items (shapes, lines, textboxes, etc.) together allows them to be moved, sized, etc. together in the same ratio, direction, etc.

BE CAREFUL RESIZING GROUPED TEXTBOXES. It can change the size of the braille font from size 29. You can group them to move them or change the box lines some way. Just do not resize them.



One method of grouping is to click on the Select Objects arrow on the Draw Toolbar and draw a rectangle around all the objects.

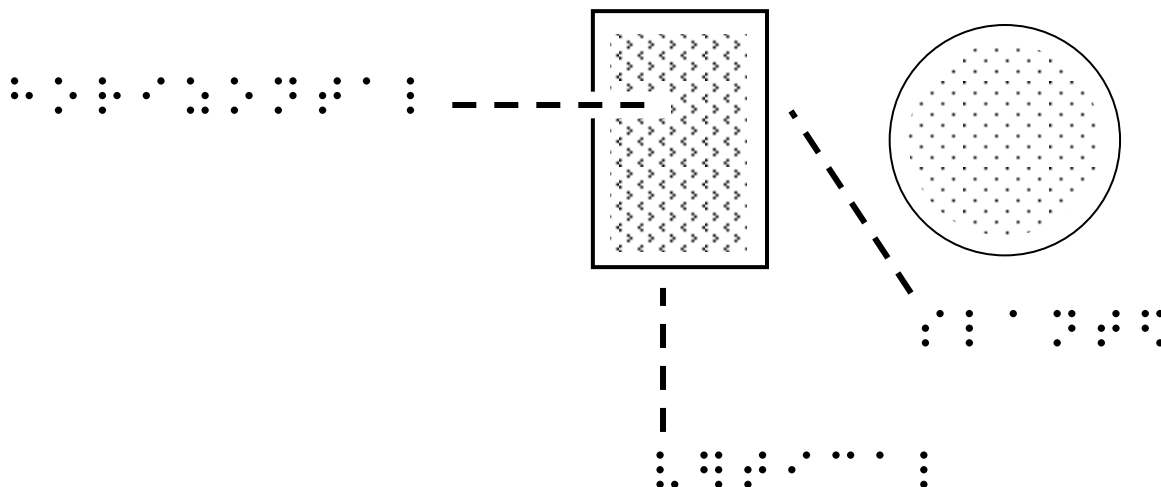


Another method is by clicking on one item, then holding down the Shift key while clicking on all the other items you want grouped together. This way works best if you are grouping all the arrows within a graphic and you do not want to group anything else with the arrows. You can hunt and pick with this method.

You have to use the Shift key method when you are drawing something with moving parts like a clock, thermometer, etc. These use layers of groups. The clock has the face with the tick marks, and numbers outside the face. You group those together. Then you draw the hands that are individually grouped, then grouped together. That way the hands may be moved on their own without accidentally moving something else on the clock. See the clock instructions.

WHEN YOU GROUP, GO TO THE FORMAT/AUTOSHAPE, OBJECT, WHATEVER, AND CLICK ON LAYOUT. CHOOSE IN FRONT OF TEXT. IT WILL USUALLY HAVE SWITCHED TO TIGHT. THE "TIGHT" CHOICE CAUSES PROBLEMS LATER BY BUMPING OBJECTS ALL OVER THE PLACE.

LEAD LINES



Lead lines may be horizontal, vertical, or slanted. They lead from the label to the item it's identifying.

Lead lines usually go up to its item allowing one cell's blank space between the end of the lead line and the item.

Lead lines sometimes have to go into the item it's identifying. When that happens, allow 1/16" of blank space all around the lead line so that it may be followed correctly.

1. Click on the **Line** icon on the **Draw Toolbar**.
2. Hold down the **Shift** key and drag your cursor to draw the line. The **Shift** key keeps the line straight.
3. To draw a lead line with the white space surrounding it into a shape:
 - a. Click on the **Line** icon on the **Draw Toolbar**.
 - b. Hold down the **Shift** key and drag your cursor to draw the line where you want it. The **Shift** key keeps the line straight.
 - c. Right-click on the line and click on the **Format AutoShape**, then the **Size** tab. Make the line at least 3/4" long.
 - d. Hold down the **Ctrl** key and type the letter **d** to duplicate the line.
 - e. Use the **Directional Arrows** to move the second "spacer" line under or even with the first which will be the "lead line".
 - f. Right-click on the spacer line and click on the **Size** tab. Make the line 10 weight.
 - g. Use the **Line Color** icon and make the wider spacer line white. Pay attention where the white line is. Try to keep the squares at each end so you can locate it.
 - h. Right-click on the wider spacer line or click **Draw** and choose **Order**. Move the spacer line backward—not "To the back".
 - i. Use the **Directional Arrows** to move the spacer line behind the first.
 - j. The wider spacer line should still be active, so hold the **Shift** key down and click on the thinner lead line.
 - k. **Group** the lines together. Now they may be moved into position between the label and into the shape.

LABELS

Braille labels are always horizontal—never slanted or vertical. They may take more than one line.

Use **No Fill, No Line** on labels on a white background.

Use a black line border and white fill on labels on a textured background. There must be a minimum of 1/8" of white space (fill) around the label text out to the border.

Whenever you can spell out the words within the boundary of what you are labeling, do so. It makes for shorter keys and better understanding.

If there is not enough room for the full label, use abbreviations and/or numbers and a key.

If at all possible, place labels close to the right of whatever they label but no closer than 1/8" (distance between 2 braille lines). Do not put the label half on and half off the graphic.

If the label cannot be placed close enough, a lead line should be used. They should be at least 3/4" without any arrowheads no matter what is in print.

Try to use different types of information lines in line graphs instead of crowding labels inside the graph to differentiate between lines. Solid, dashed, and dotted are the best styles to use. Others such as the dot-dash-dot, etc. are too confusing.

Bar and Line graph measurement labels go down the left side and across the bottom of the graph even if they're on the right and top in print.

Pie chart labels go on the outside of the chart.

Clock numbers (labels) go on the outside of the circle clock near the 1/2" tick marks.

Thermometer numbers go on the outside right of the rectangle tube. Use 1/2" tick marks.

ADDING TEXT AND LABELS TO YOUR TACTILE GRAPHIC

Inserting text before the graphic helps to determine how large your graphic can be. You may find that all you can have on the page with the graphic is the title and the labels. You may have to put the explanatory text, questions, and the key, if needed, on other pages.

1. **Open** your Braille Graphic Template.
2. **Save As** the title of the book and name of your graphic as well as the print page number such as **AH Louisiana Purchase Map p 02** for the Louisiana Purchase map on print page 02 in the textbook titled American History. **Make sure you save your template as a document file before you do anything at all to the template. You do not want to mess up your template.**
3. Braille your text and copy it to the clipboard and onto your Word document. In Braille2000, if you right-click the **Copy** button on the **Control Panel**, you can choose **Lines**. This keeps the correct format and page numbers.
You may also type in **ASCII** directly into the Word document. Several ASCII files are on the CD you were given along with this handout. Print out the Word ASCII files to have on hand as cheat sheets.
4. Make sure your page size and margins are set at 11.5 x 11" page size and 1" margins on the top, bottom, and left and .5" on the right.
5. Use **Ctrl-a** to highlight the entire page and change the font to BraillePuffDots size 24 for regular ink printers and Braille29 for graphics embossed on a ViewPlus embosser.
6. Making sure all of the text is still highlighted, go to **Format > Paragraph** and change the **Line Spacing** to **Exactly** at **25** for text in **BraillePuffDots** font and to **Exactly 29** for text in **Braille29** font.
7. If your last line or your braille page number is not on line 25, add blank lines until it is. This makes it easier to insert your graphic correctly.
8. If you copied your label text into the Word document as well, all you need to do is to highlight each word or phrase individually and choose **Insert > Textbox**. The highlighted text will be copied automatically into the textbox.
9. If the textbox is not the correct size, right-click on the border of the textbox and choose **Format > Textbox**. Change the **Layout** to **Behind Text**, **Color and Lines** to **No Fill**, **No Line**, and **Size** to the appropriate size so that there's white empty space around the text. Usually a one-line label needs to be .45 high to allow enough room.
10. If there's not enough room for the graphic and labels, delete all unnecessary braille text and put it on another page. If there's anyway that the key can go on the same page as the graphic, put it there.
11. You may either insert a scanned image and trace it or draw the image manually.

KEYS

The word Key should be started in cell 5 after a transcribers note symbol (dots 6, 1). The key should end with another transcriber's note symbol. Skip a line after Key.

Place the subdivision names such as *Lakes*, *Routes*, or whatever you've named the groups of items in your key, in cell 5 with a skipped line before but not after.

Within the key, textures should be listed first, then lines and arrows, symbols, letter abbreviations, and finally number abbreviations within any subdivision of the key (Countries, Rivers, Towns, and Battles, etc.)

Place textures inside rectangles in the key. 1/2" by 1" would be best size to give enough area for the fingers to feel. They should begin in cell 1.

Lines within the key should be 1" long.

Symbols should be centered between braille cell 1 and 4.

Except for graphs (bar graphs, line graphs, circle graphs, etc.), items are listed alphabetically according to the full word, not necessarily the abbreviation.

For graphs, the key abbreviations are listed in the order they appear on the graph—left to right, top to bottom, clockwise from the top, etc.

At least one of the letters in the abbreviation must have both upper-cell and lower-cell dots or the dot numbers must be given within parenthesis with number indicators and a comma between.

■ ■

Try to use abbreviations that help to identify the item easier and try to use the same naming method for all items--first two letters of a name, use letter L along with first letter of name for all lakes, postal abbreviations for states, etc.

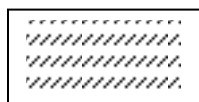
Numbered keys are listed in numerical order.



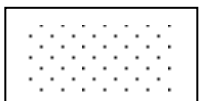










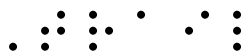




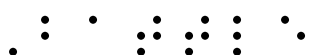






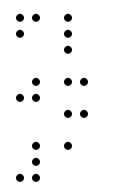
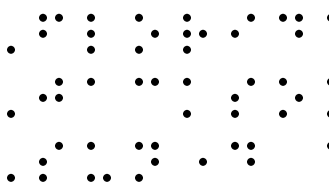
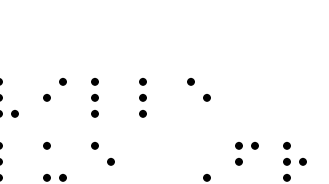
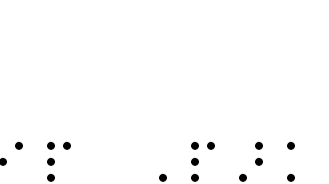












This is not the full 11.5 x 11" graphic page. It is only 11 x 8.5" landscape oriented. This is why there is no braille page number at the bottom.

PART II

Line Graphs

Bar Graphs

Histograms

Venn Diagrams

Circle Graphs or Pie Charts

Spinners

Clocks

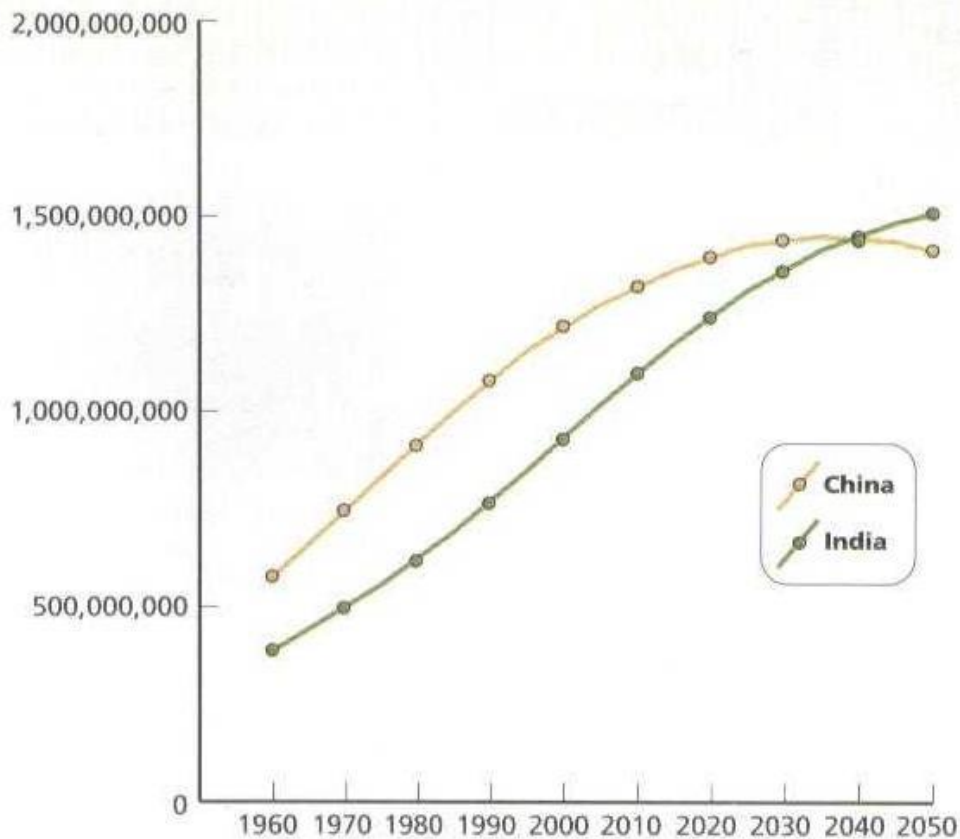
3-D Shapes

LINE GRAPH PRINT SAMPLE

India and China

China and India are the world's population giants. Both have populations of more than one billion people. India's population, however, is growing faster. By 2040 it will be larger than China's. Since about 1980, China has strictly limited how many children a family may have and has brought down its rate of population growth.

India and China Population Growth

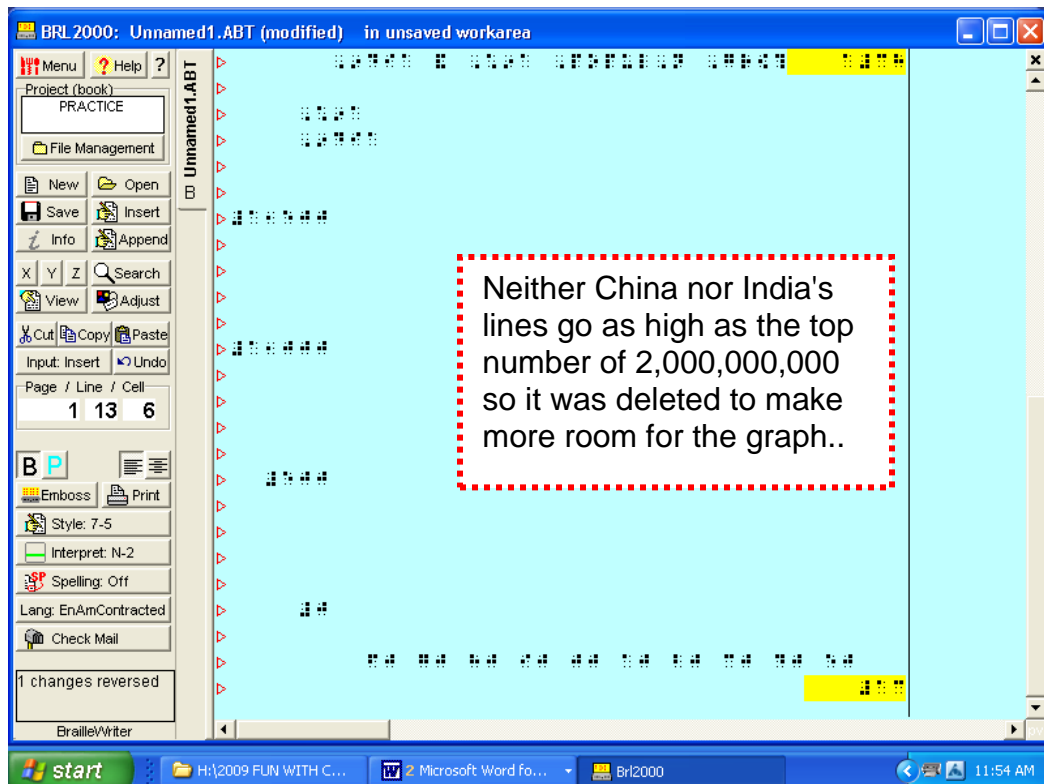
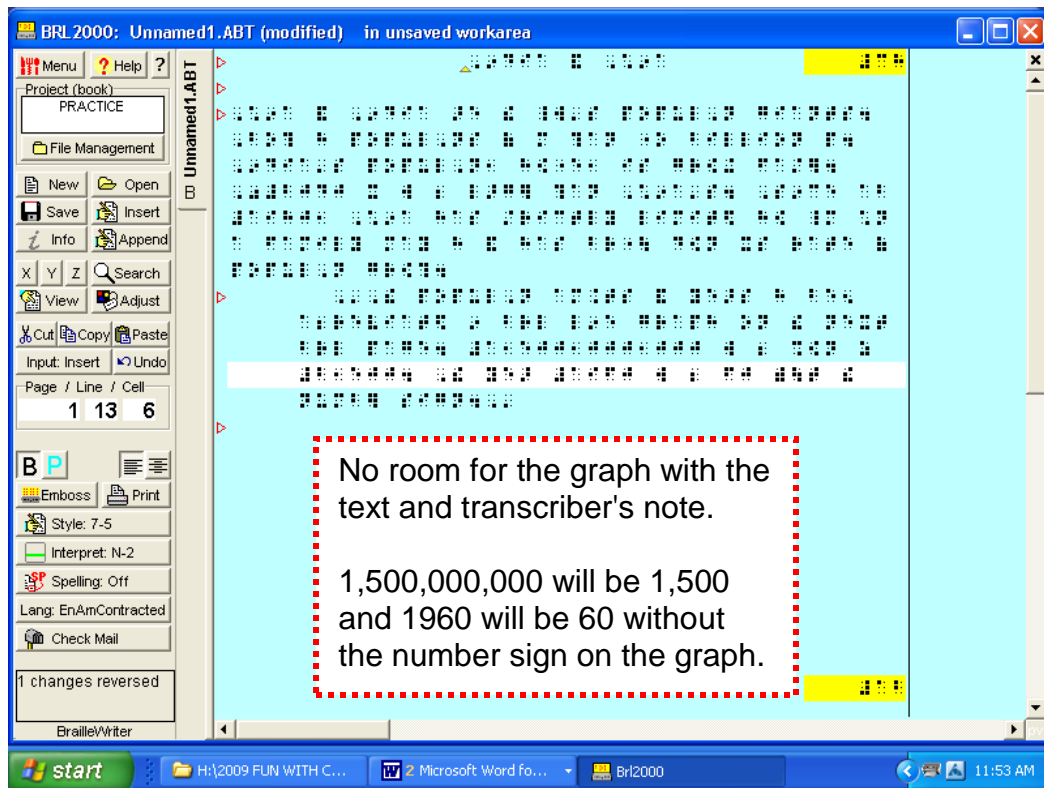


Even though they are not in the print graph, we need to add grid lines inside the graph, tick marks on the outside borders, and move the legend/key to the top. The graph may have to be changed in other ways so that it will fit on one page and/or be easier to understand.

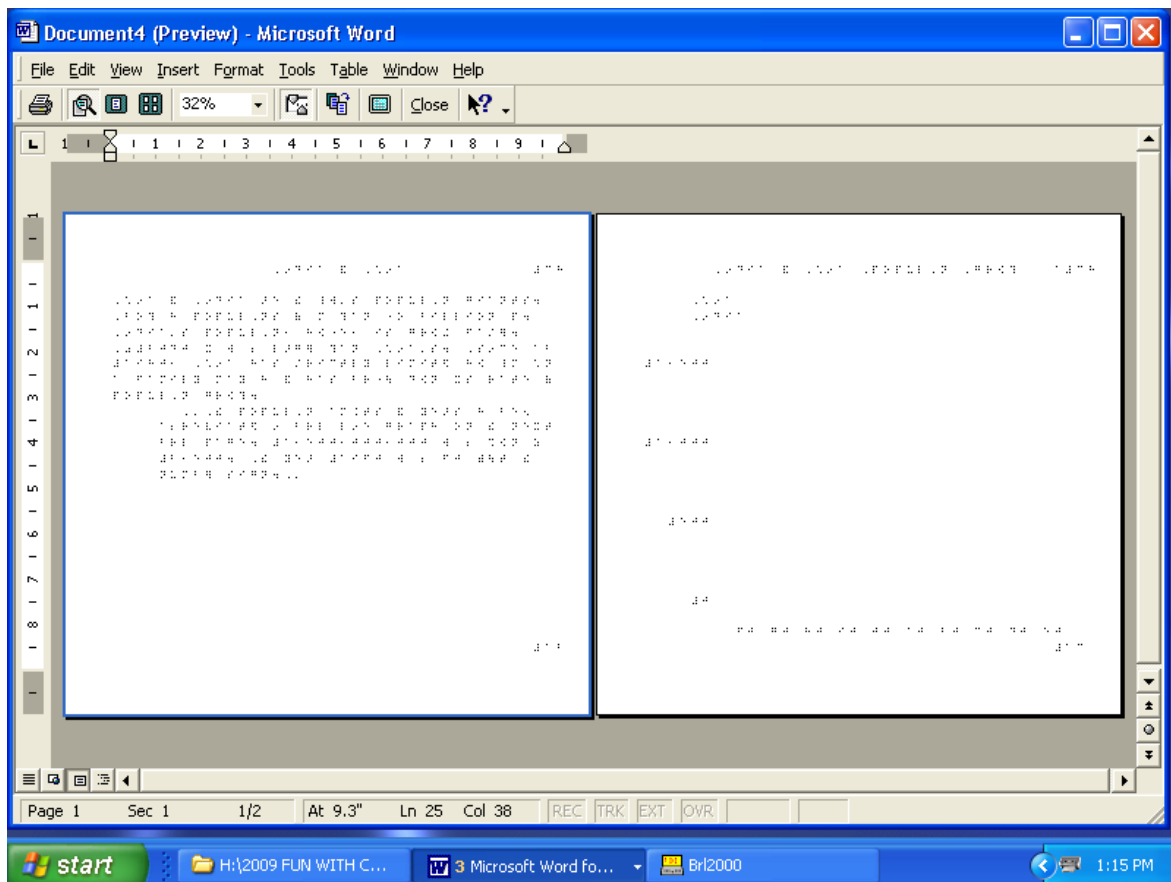
LET'S MAKE A LINE GRAPH

1. Open your Braille Graphic Template and **IMMEDIATELY Save As** it under your book initials, graphic title, print page number. (AHIndianVillage P 08A for American History textbook Indian Village graphic on print page a8) Otherwise you will mess up your graphic template. You could also use P 08A Indian Village bar graph in the American History folder..
2. Use ASCII or your braille program to braille the centered heading and page numbers in the correct location for the graphic and/or key page. You can use Braille2000's **Page Numbering** command. Also braille the baseline labels and side labels. You may have to put each label inside a textbox later after you've drawn your graph, etc. so that it may be moved in small increments to fit better. Experience will tell you.
3. Highlight the entire braille page by holding down the **Ctrl** key while pressing the **a** key. (**Ctrl-a = Copy All**)
4. **Right click** the **Copy** button on the Braille2000's Control Panel and choose **Lines**.
5. Open your Tiger Graphic Page 11.5 x 11 template or file. You may have to use **New**.
6. **Paste** the braille into the Word file by pressing **Ctrl-v** or going to Home tab, then **Paste**. The braille may be ASCII or braille dots.
7. Choose **Braille29** size **29 for ViewPlus embossers** as the font.
8. Space out the braille cells and lines by going to **Format**, then **Paragraph**.
9. **Change Line Spacing** to **Exactly** at 28 for the **Braille29** font. Everything should be in correct place.
10. If you do not have the rulers and grid lines on your screen, add at least the rulers.
11. Now you can add the **Grid Lines** if you like them.

LINE GRAPH BRAILLE TEXT



BRAILLE TEXT PASTED INTO WORD FILE



You do not have to paste both pages into Word unless you have to put your key on the previous page and the key needs textures, lines, etc. If your key only needs words, abbreviations or numbers, just braille it within your braille text file.

Remember to start and end your key with a transcriber's note indicator.

Double-check to make sure your font is Braille29 font size 29.) Your page should be **11.5 x 11"** (portrait orientation) with margins of top of 0.6, left of 1.0 and bottom and right margins of 0.5" . Make sure your Line Spacing is Exactly 28.)

SAVE YOUR WORK! Make sure all your braille text and page numbers are in the correct place. **SAVE YOUR WORK AGAIN! MAKE A BACKUP!**

Add Grid Lines

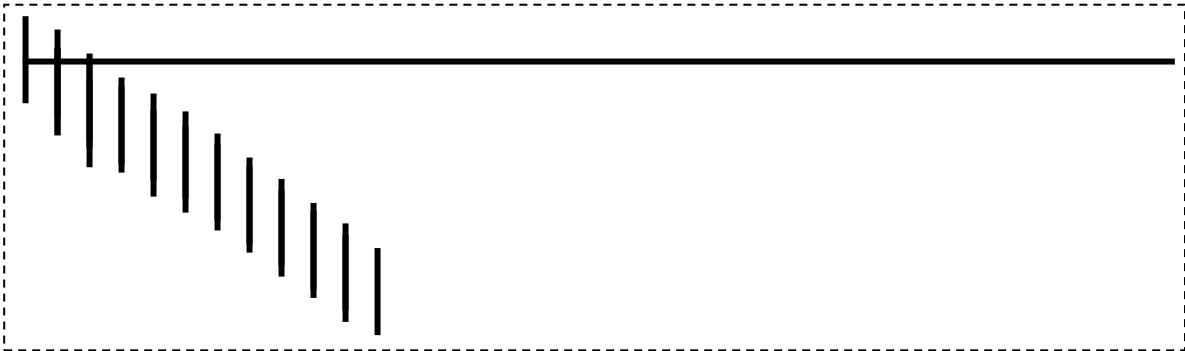
1. Make sure you have your ruler across the top and sides of your screen. To add the ruler, go to **View** and click **Ruler**. You may have to do it twice to get both top and side rulers.
2. Draw a **1/2"** vertical line (above first number, abbreviation, etc. across the bottom). Make it **2.25** (2-1/4) **pt.** Tick marks have to be 1/2" long with 1/4" on each side of the horizontal line. Grid lines are only .75 pt and dotted so tick marks overlay.



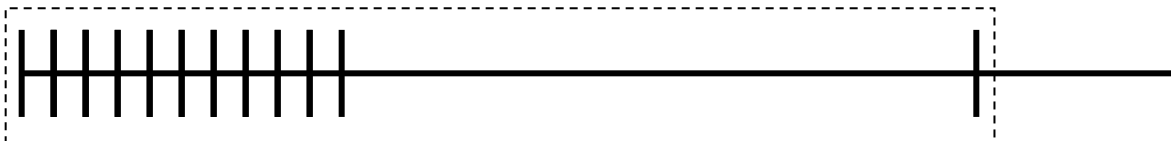
4. Draw a horizontal line from the middle of the vertical line across the page approximately the width of your page. It can be enlarged or reduced later.



5. Select the vertical line and duplicate it by holding down the **Ctrl** key and pressing the letter **d** key as many times as you need tick marks. Make sure to count the first and last tick marks.

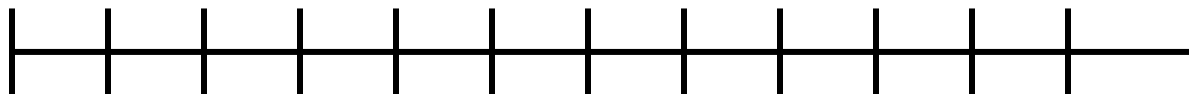


6. Select the horizontal and all of the vertical lines. Go to **Draw / Align and Distribute**. Choose **Align middle**. Then move the vertical line farthest to the right close to the width of grid you need (above the last number, etc. to the right). **SAVE YOUR WORK!**

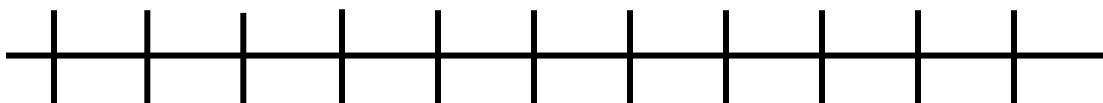


7. Select all the vertical lines without going to the end of the horizontal line. This way the vertical lines will equally distribute the lines the distance from the first to the last vertical line and not to the end of the horizontal line.

8. Click on **Draw** on the **Draw toolbar** and choose **Align or Distribute**. Choose **Align horizontally**. Now your lines should be distributed equally horizontally across the horizontal line as below.



9. Right-Click on the horizontal line and choose **Size**. Change the width so that both ends touch the first and last vertical lines. If you need a tick mark on the bottom left of the graph, allow for it or add a 1/4" line to the left. Look at the top ruler to see.



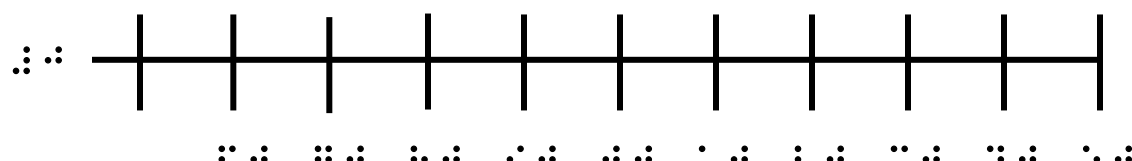
10. Group the lines together. **There are two methods**. Sometimes one works better than the other. Use Method B when you only want to group certain lines, etc. This makes it easier to move and modify the group of lines.

Method A:

- Click on the **Select Objects** white arrow next to "Draw" on the left side of the **Draw Toolbar**.
- Hold down the **Left Mouse** button and drag the line around all of the lines that you want to be grouped. You will notice that there are small squares at the ends of every line.
- Click on **Draw** on the **Draw Toolbar** and then **Group** to group all the lines together. You can tell the group of lines is grouped by noticing the small squares at each corner and middle of each side of the grouped area.

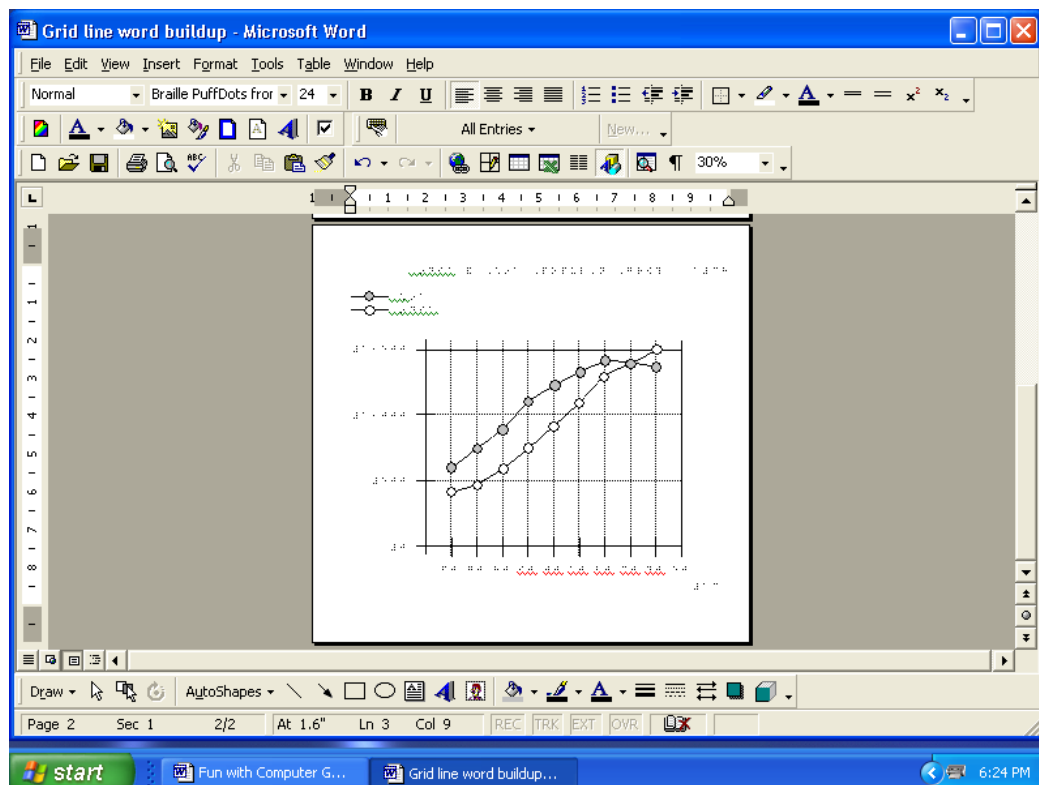
Method B:

- Click on one of the lines.
 - Hold down the **Shift** key while clicking all the other lines you want to group with the **Left-Mouse Button**. All the lines have small squares at the ends.
 - Click on **Draw** on the **Draw Toolbar** and then **Group** to group all the lines together. You can tell the group of lines is grouped by noticing the small squares at each corner and middle of each side of the grouped area.
11. After you grouped your lines together, move it so that the vertical lines line up above the year abbreviations. Don't put anything under the first tick mark in this instance. Line up the horizontal line with the middle dots of the braille cell in 0. **SAVE YOUR WORK!**



-

20. Draw another filled circle. Duplicate it and move the other circles where China's circles should be on the grid lines. Duplicate an extra circle and change the fill color to white. Duplicate the white circle and place the other circles where India's circles should be on the grid lines. **SAVE.**
21. Start a line at the first of China's filled circles and end it close to the last of the filled circles. Right-click on the line and choose **Edit Points**. Drag each end of the line into the middle of the end filled circles. Now drag the line into each of the other filled circles. It may not look exactly like the print, but it will be close. The proportions of the graph may be slightly different than the print graph.
22. Repeat with India's white circles. **Group** and **SAVE!**
23. You will need to delete the year abbreviations because they do not fit correctly under the bottom tick marks. **Insert a Text Box** and type fj and highlight the two letters and change the font to Braille29 size 29.) Right click the border of the text box and change the height to .45" and make the width .75". Duplicate enough of the textboxes to match the tick marks. Move them into place and change each one to the correct numbers. Remember that braille numbers are really letters with the number sign in front but the transcriber's note said we would not be using the number sign. fj is 60, gj is 70, and so on. **SAVE!**

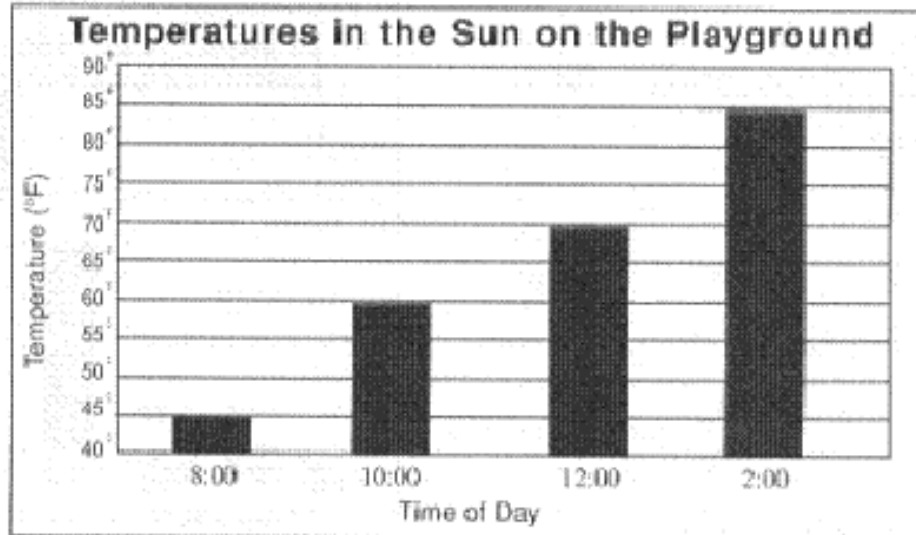


BAR GRAPH PRINT SAMPLES

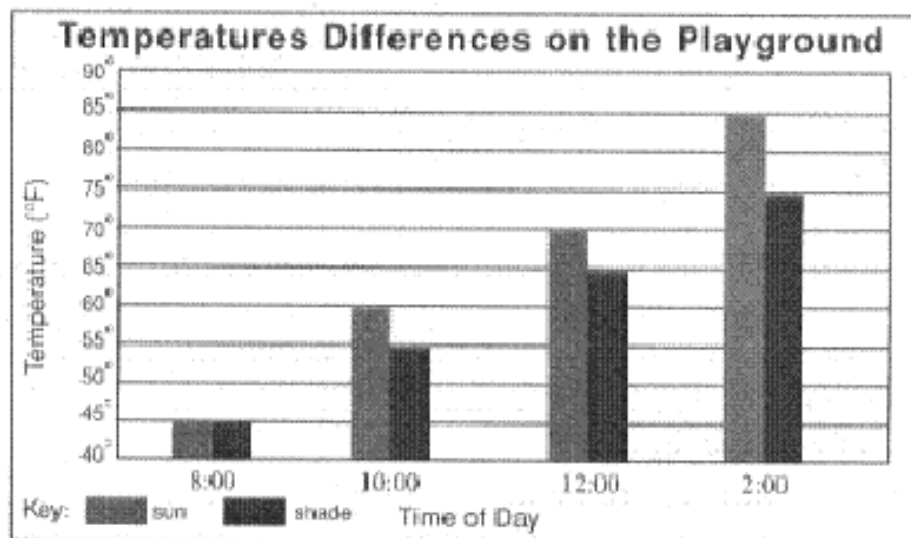
Bar Graphs

One type of graph that gives us information is called a bar graph. A bar graph shows us many different types of things by the height or length of the bars.

A single bar graph is one type of bar graph. Questions that ask what kind, what place, how much, how long, and how many can be answered by using a single bar graph.



A *double bar graph* (or *multiple bar graph*) is another type of bar graph. It is used to compare two or more things.



Find examples of single and double bar graphs. Share what you find with your class.

DRAWING A DOUBLE BAR GRAPH

Each of the bars on the bar graph should be 1/2" wide. Try to separate each bar at least 1/4" apart unless the bars are connected in print.

If you have more than one graph with basically the same labels and number of lines, complete one blank graph and save it to use later with other graphs. Just copy and paste it into place. Just change the title, etc.

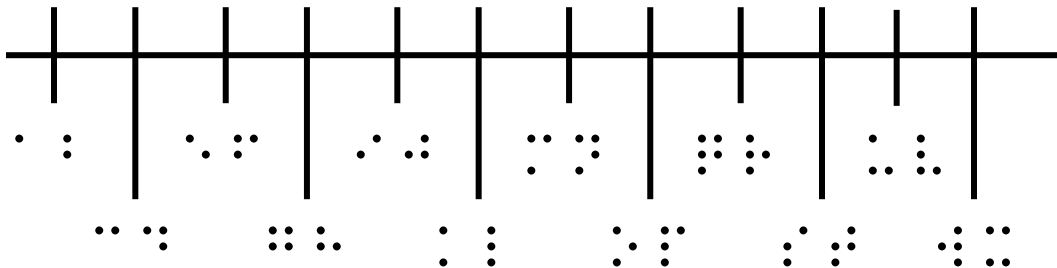
Some bar graphs have vertical bars and others have horizontal bars. Make the braille graphs the same direction as the print unless there is not enough room on the braille page.

As long as you add a transcriber's note regarding the change in orientation, the graph may be turned from vertical to horizontal, etc. in order to get the entire graph on one page. Lowest number should be on left on bottom.

Some graphs are so long that they have to be divided between braille pages. Make sure to add a transcriber's note regarding the change and label partial graphs.

Labels on graphs may be abbreviated and used with a key.

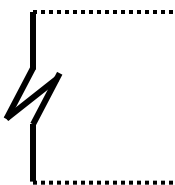
Labels may be staggered to make them fit horizontally.



The vertical title of the left-side labels should be moved to the line above the top label. Remember that labels cannot be brailled vertically.

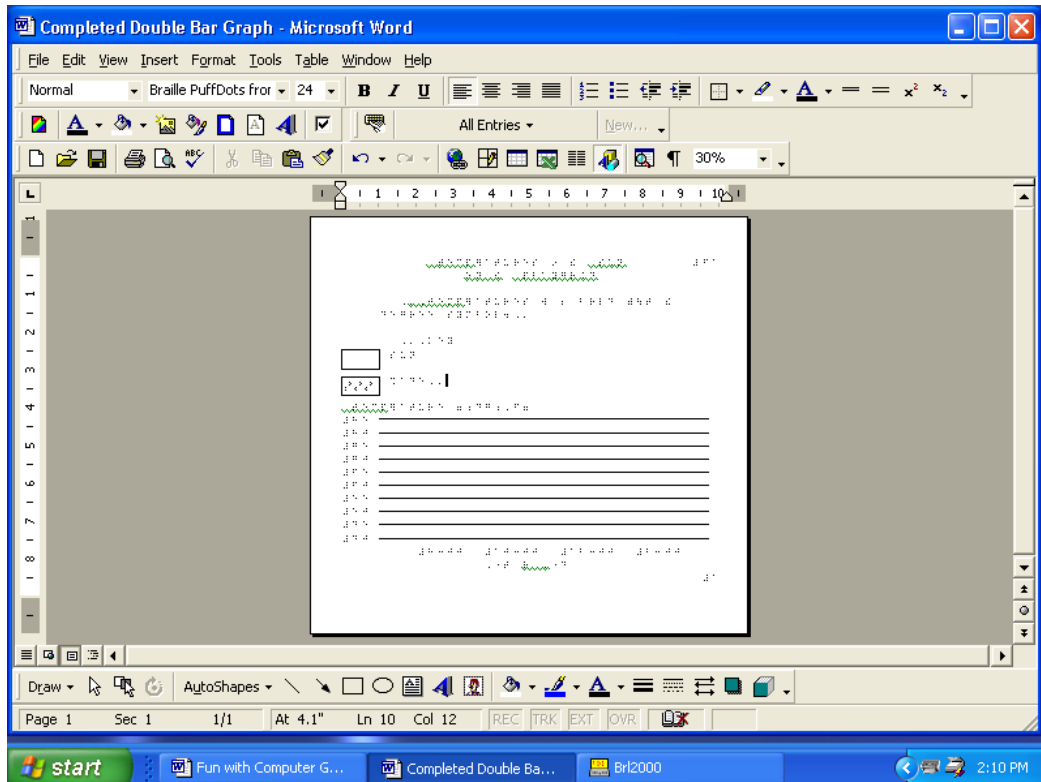
You usually do not need both vertical and horizontal grid lines in a bar graph. Vertical bars require horizontal lines while horizontal bars require vertical lines.

You can delete tick marks and grid lines from either the top or the bottom if none of the bars reach those top marks or if all the bars are higher than the second from the bottom tick mark and grid line. Only do this if you need the room to fit the rest of the graph.



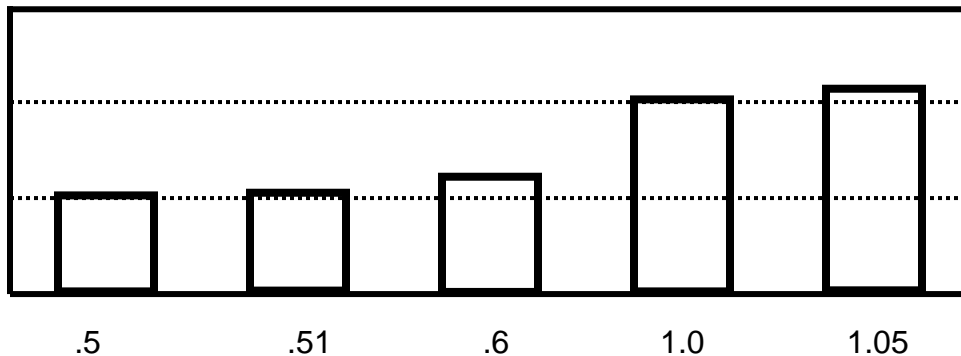
If slanted lines on the left vertical border indicate missing measurements and tick marks, include the slanted lines.

DOUBLE BAR GRAPH

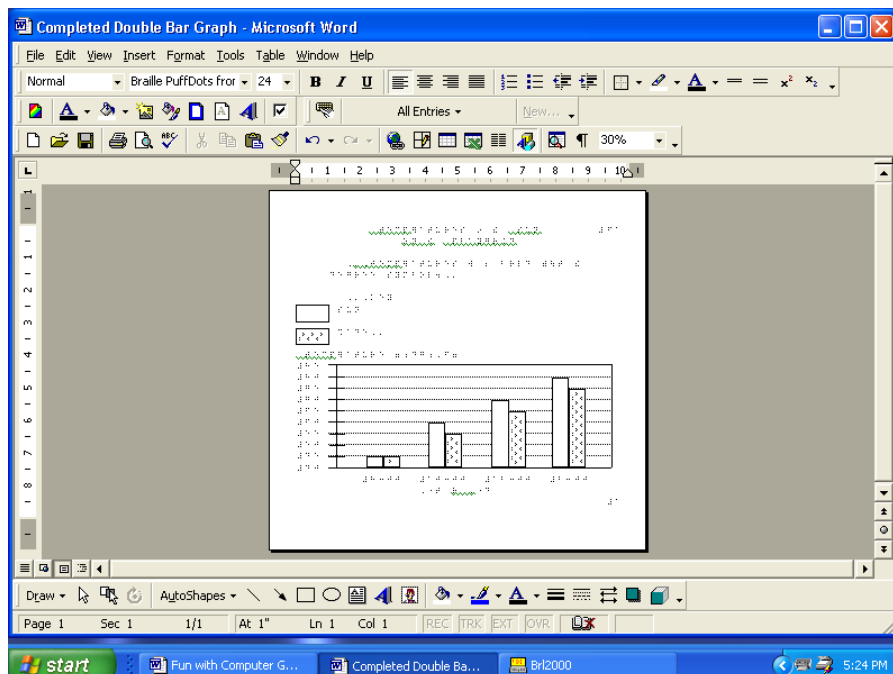


1. After you braille (or type and translate) the text and paste it into your braille graphic template page, **Save As** another name.
2. Draw a horizontal line from about .25" from the middle dots of ⠆⠑⠏⠒ (#85) to the right a little way past ⠆⠑⠐⠒ (2:00) so it looks the length of the print line. Make it
3. Duplicate the line so that you have enough grid lines to match all of the tick marks. Change all of the grid lines, except the top and bottom lines, to **.75 pt** and **dotted**. Make the top and bottom lines **2.25 pt** and **solid**.
4. Use the **Select Objects** arrow on the **Draw toolbar** to select all of the lines.
5. Click on **Draw / Align or Distribute** and choose **Align Left**. Move the top line next to the middle dots of #85 and the bottom to the middle dots of #40..
6. **Select** all of the lines again. Now **Align Vertically**.
7. Draw a vertical line from .25" from the left end of the #40 grid line to the #85 grid line. Match its size to the top and bottom lines. Duplicate it and move it to the right margin. If you need to shorten the vertical lines, do so before moving it. **SAVE!**

8. Click on the **Rectangle** icon on the **Draw toolbar** and draw a 1/2" wide bar above one of the times. You will change the height later. Duplicate it enough times to make all the bars on the graph. You do not need any tick marks.
9. Drag the first bar to the correct height. If it's still not quite correct, right click on the bar, click **Format AutoShape / Size**, and increase or decrease the height as needed. You can change the size by .1" or .01".

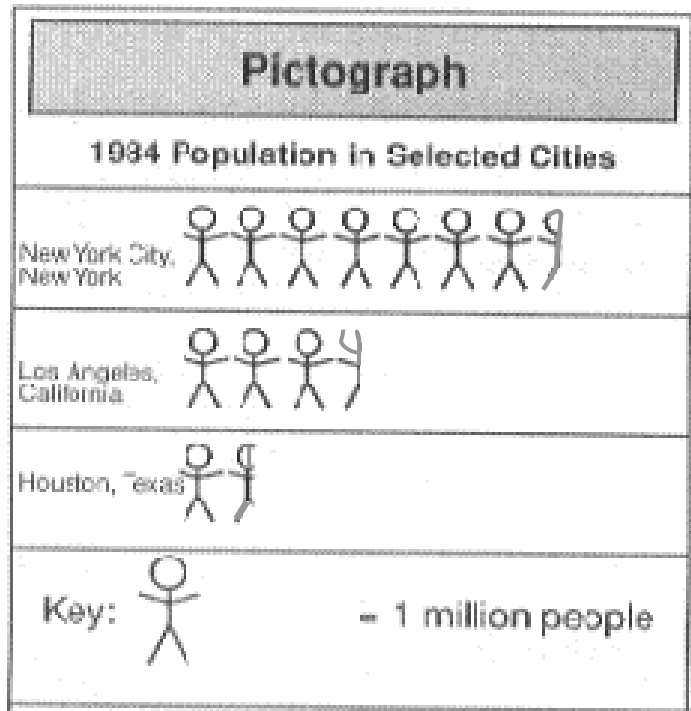


10. Move the pairs of bars next to each other and center the pairs over their time. You may have to move the times by spacing or insert the times into textboxes that can be more easily moved.
11. **Fill** in the shade bars with whatever texture(s) you chose for your key. Make sure you put your .5 x 1.0" rectangles in your key. One of the bars can be white and the other shaded or a light gray. Shaded is better.
12. Group the shade and the bar together, then group the shaded bar and the white bar next to it together. Group the entire graph together.
13. **SAVE YOUR WORK! BACK IT UP!**



PICTOGRAPHS

Pictographs use pictures and/or parts of pictures to represent amounts of data.



Pictographs for students in K-3 grades must be a tactile graphic. Use shapes if the actual picture cannot be reproduced discernibly. The student won't be able to tell the difference between apples and oranges, etc. You can also use the full braille cell.

Simple pictographs (only for whole or half items) for students in grades 4 and above can be brailled instead of using tactile graphics. The full cell would be one and dots 123 would be half.

A transcriber's note is needed to explain that a substitution has been made.

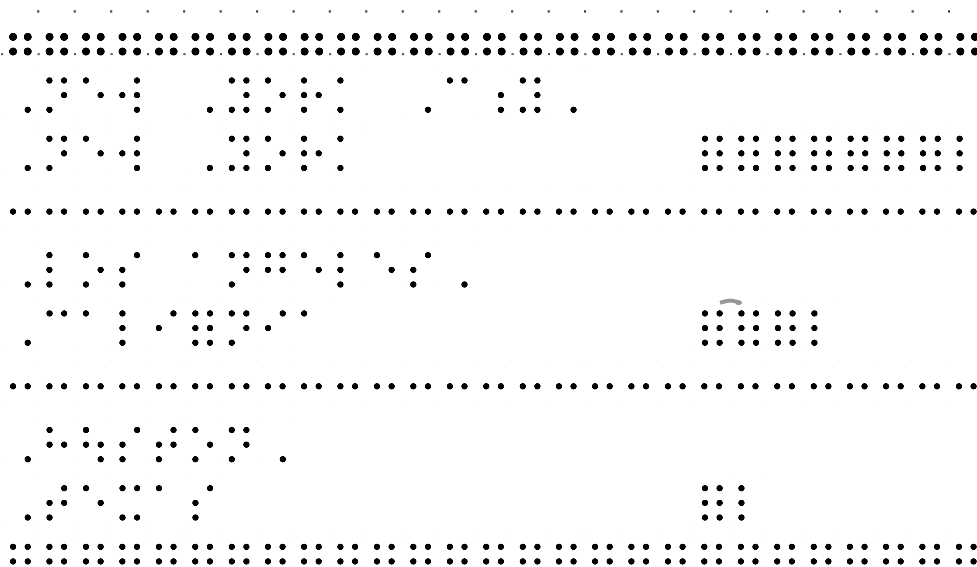
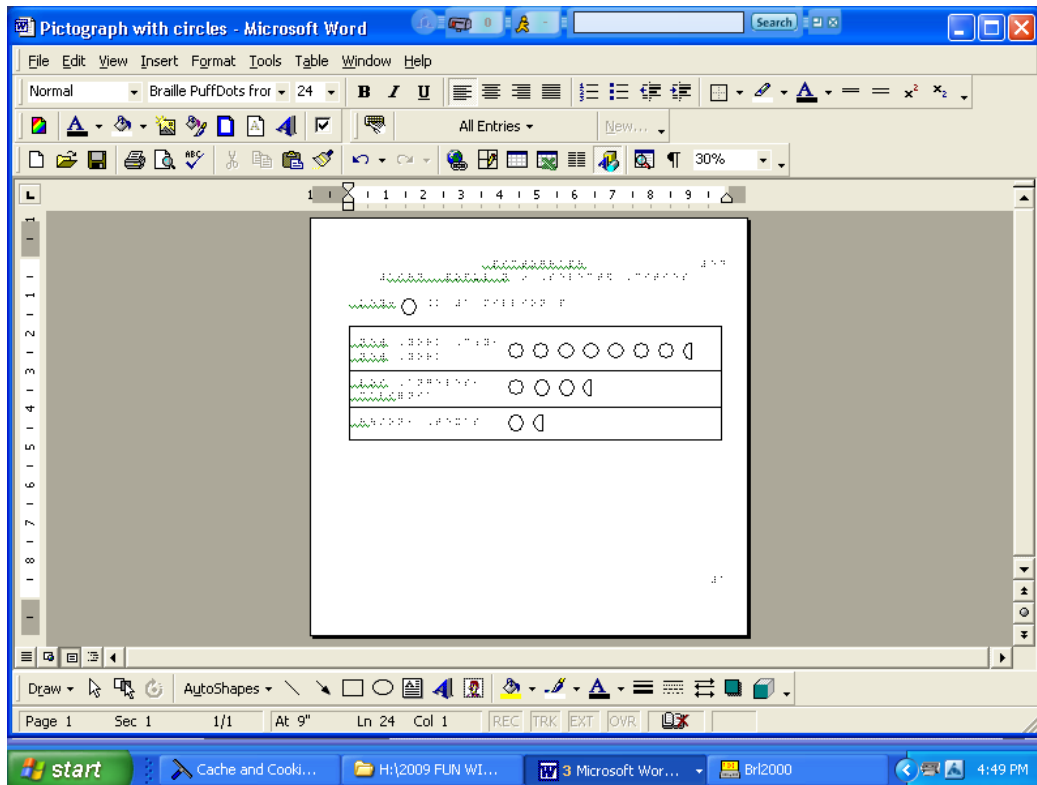
Leave one space between the row heading and the first item.

If the graph shows boxing lines, you may use braille boxing lines (top = 2356 and bottom = 1245).

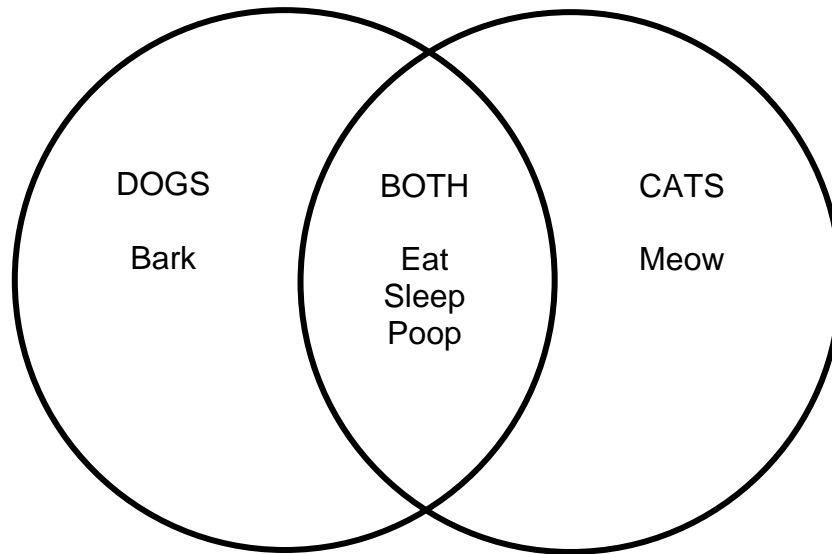
The key of a pictograph (usually on the bottom in print) should be above the graph.

Use number signs in pictographs.

COMPLETED PICTOGRAPH



VENN DIAGRAMS



Give the two (or more) circles different line styles—solid and dashed or solid and dotted.

Center the labels inside the overlapping circles. If the labels are a little too large to fit, try stretching the circles into ovals to make more room. If the labels are still too large to fit, use abbreviations and a key.

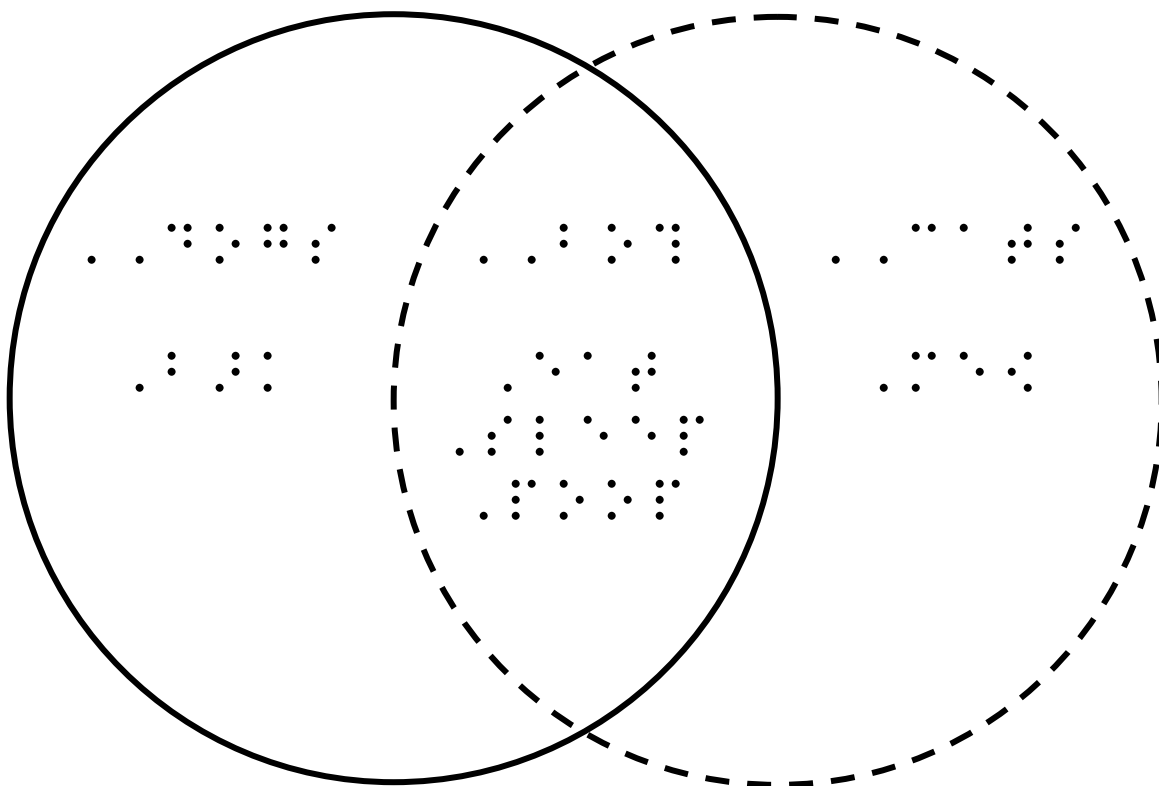
If a rectangle surrounds the circles in print, include it in your graphic.

Use the numeric indicator if numbers are listed.

1. Draw a circle using **AutoShapes** or the **Oval** icon on the Draw Taskbar.
2. **No Fill** and a black line between 2 and 2.5 pt
3. **Ctrl-d** to duplicate the circle.
4. Match the print with whichever type of line to use for the ovals. Change the line to a dashed or dotted line using the **Dashed Style** icon on the **Draw Taskbar** or right click on the second circle to get **Format**, then **Color and Lines** and change the width to 2-2.5 pt.
5. Overlap one circle with the other and group them by the **Select Object** arrow, then **Group**.
6. Insert textboxes for the inside information and center the information within each circle. Use **No Fill**, **No Line** for the textboxes.
7. Group the textboxes together. Now group everything.

Notice how much bigger the Venn diagram needs to be because of the braille font.
These went from 2.81" in diameter each to 4.0" in diameter each just to make room.

Also notice how much blank space is between the text and the lines.

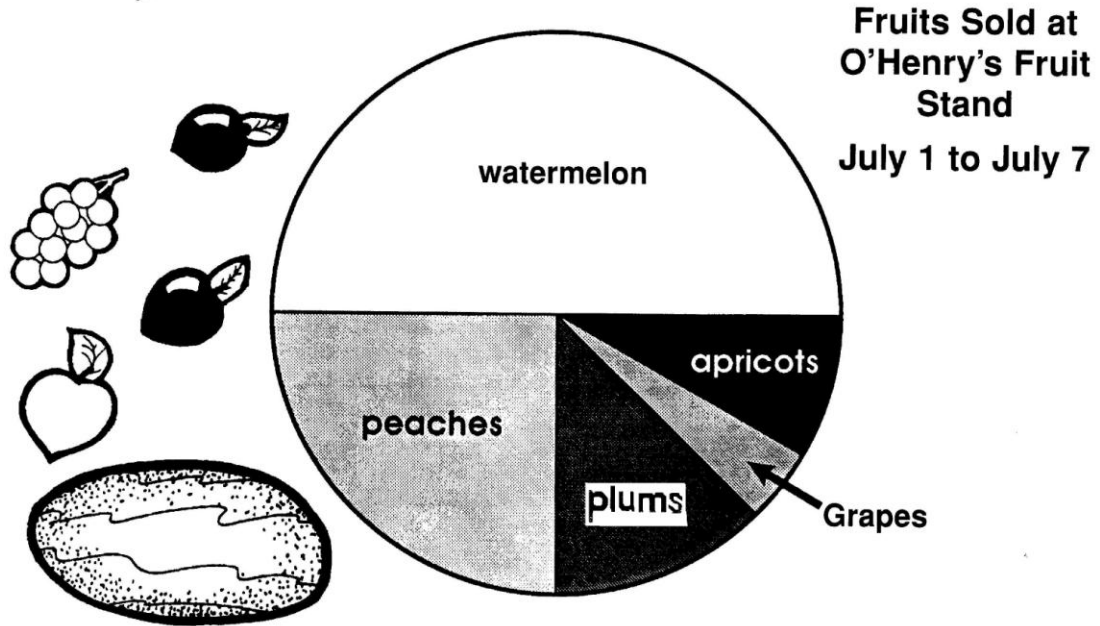


CIRCLE GRAPH OR PIE CHART PRINT SAMPLE

Circle Graphs

One type of graph that gives us information is called a circle graph. In a circle graph, you can show how things are divided into the parts of a whole.

Shown in this circle graph are the types and amounts of fruit sold at a produce stand in a week in July.



1. What fruit sold the most at O'Henry's Fruit Stand? _____
2. What fruit sold the least? _____
3. Rank the order of the fruits that were sold. Number 1 will be the fruit that sold most, number 5, least.
1. _____ 2. _____ 3. _____
4. _____ 5. _____
4. Circle the correct fraction.
Watermelon was $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{8}$ of all the fruit sold.
Peaches were $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{8}$ of all the fruit sold.
Plums were $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{8}$ of all the fruit sold.
5. Which of the fruits represented on the circle graph is your favorite?

CIRCLE GRAPH OR PIE CHART INFORMATION

The outside circle line should be a different kind of line than the inside lines of a pie chart—solid outside and possibly dotted inside.

If inside lines are too close together in the center of the chart to distinguish, stop them just short of the center so everything is not packed together in one lump.

The circle graph may be turned some to make it easier to label the sections.

Labels go outside the circle.

Labels that are too long to go along the circle should be changed to abbreviations and added to a key.

Use the numeric indicator with numbers.

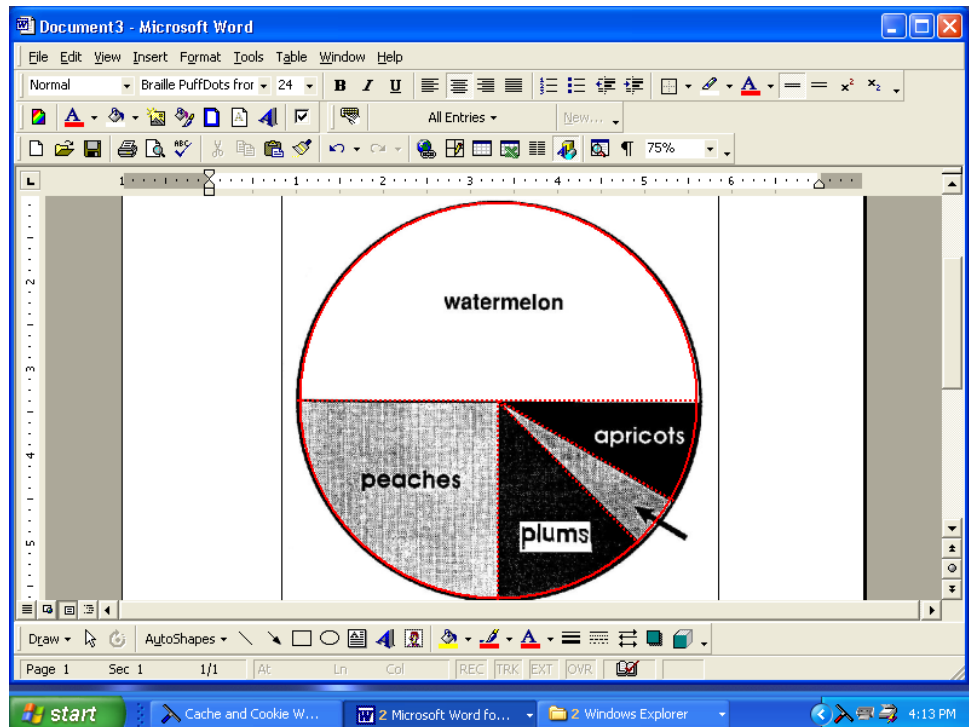
Do not use textures within a pie chart or circle graph unless they are there for a specific reason. You can mention the color of a section within the key description or label.

Unless it is necessary to know the exact size of the pie chart's sections, you can estimate where the inner lines go. The measurement percentages are given in print a lot of times.

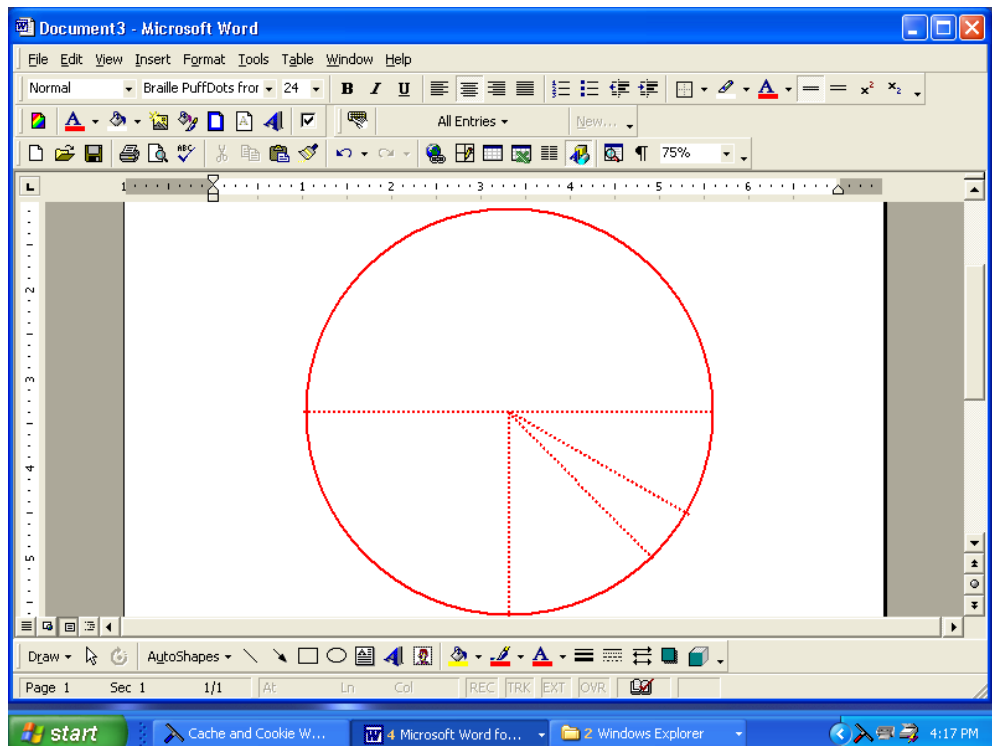
If the pie or circle chart is simply divided into halves, fourths, or eighths, you can draw temporary lines from the shape's border small squares to use as a guide.

You can either scan and trace the print pie chart or enlarge the print copy enough to use a protractor to measure the angles to reproduce the inner lines correctly.

SCANNED PIE CHART TRACED IN RED

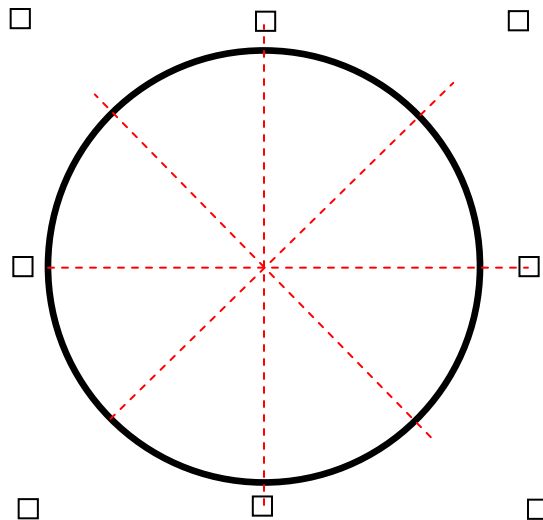


ORIGINAL SCANNED IMAGE DELETED

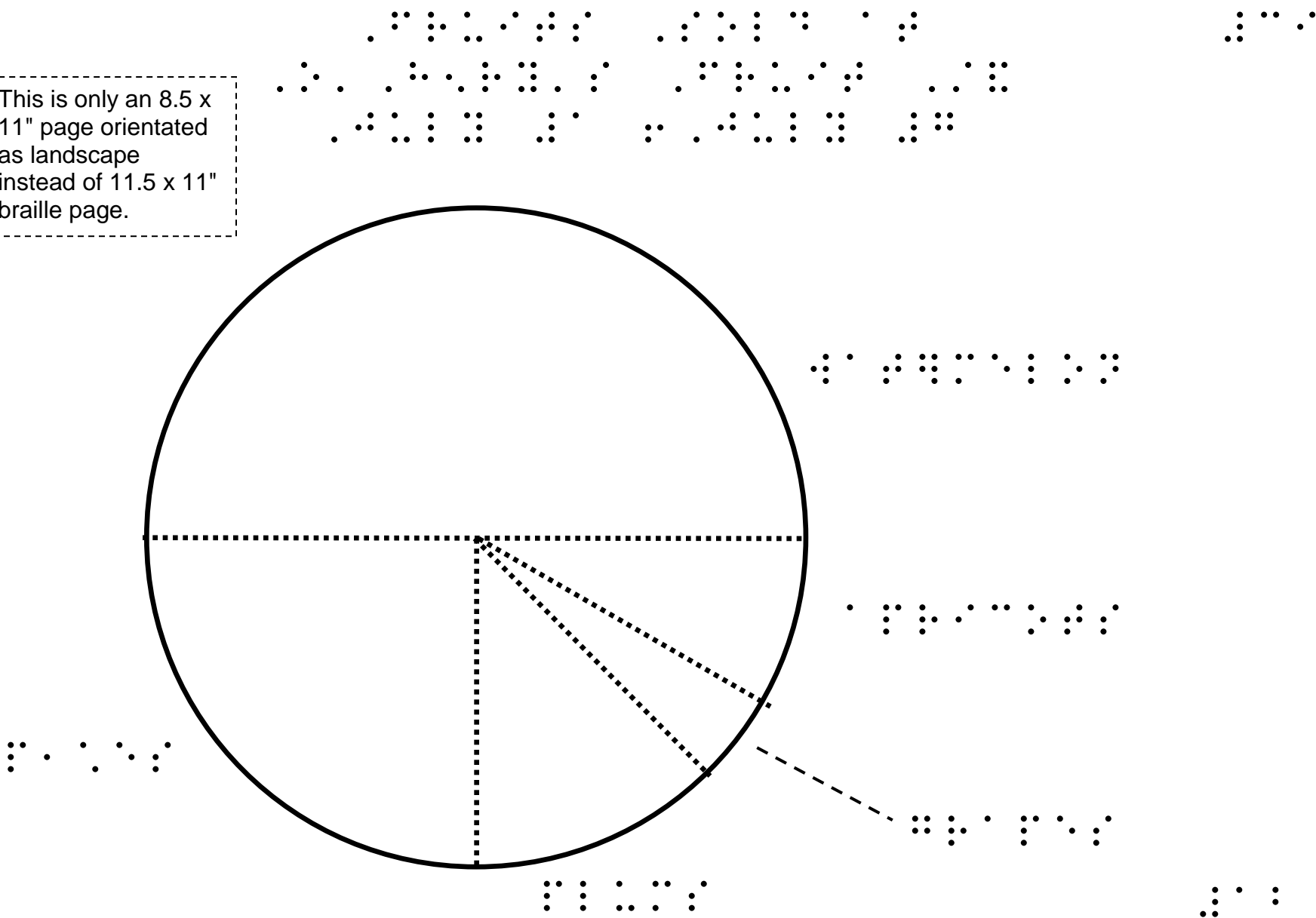


DRAWING THE PIE CHART

1. **Open** your graphics file with the braille text.
2. Click on either the **Oval** or click on **AutoShapes > Oval** on the **Draw Toolbar**.
3. Click where you want the circle on your graphics page. It probably won't be in the exact place you want it, but you can move it using the **Ctrl** key and the **Directional Arrows**.
4. Either hold down the **Shift** key and drag the circle to the size you want or right-click on the circle's border and choose **Format > Size** to choose the correct size. Make sure you click **Lock Aspect Ratio** before changing the size.
5. Right-click on the circle's border and choose **Format > Colors and Lines** to choose **No Fill, Black Line**. Make the line **2.5-3 pts** width and **solid**.
6. Click on the circle so that the small blank squares appear. Use these squares as guides in dividing the circle into halves, quarters, and eighths with dashed or red lines. They can extend past the circle's borders as they will be deleted later.
7. If the student does not have to measure the angles, try to get as close as possible. It's not necessary to get it exactly unless measured.
8. Use black 2.5 dotted lines for the inner dividing lines.
9. Do not use **Fill** for pie charts.
10. Labels go outside the pie chart to make it easier to fill the dividing lines and space of each section of the pie chart.



This is only an 8.5 x 11" page orientated as landscape instead of 11.5 x 11" braille page.

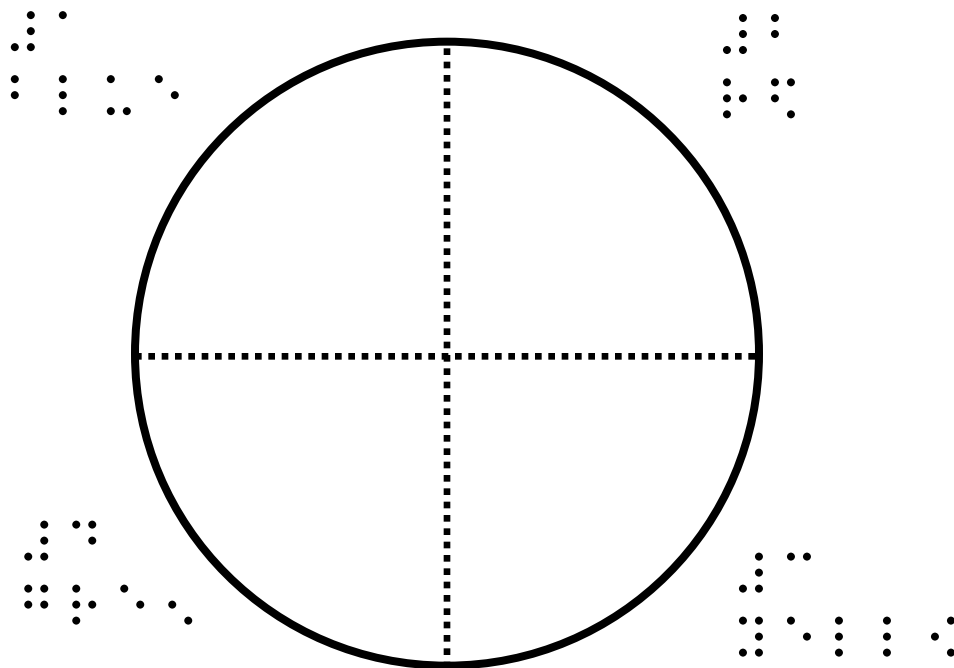


DRAWING SPINNERS

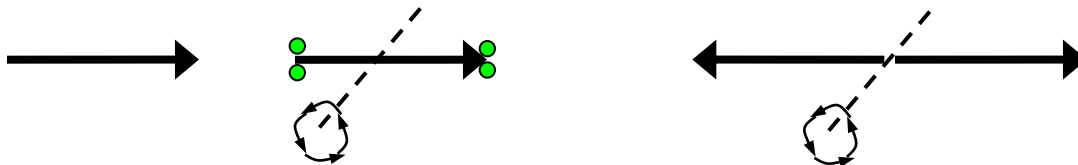
Spinners are used for games or probabilities. They are drawn the same way as pie charts are except for the added spinner inside. Most have to be enlarged to make it easier to feel the sections.

Outside and inside lines must be different. The arrow spinner is a simple arrow and a different line than the other lines.

Do not use texture on a spinner. If the circle sections are different colors, name the color as a label placed $\frac{1}{8}$ " outside the circle. If the labels are too long, use abbreviations and a key.



You can make a spinner that will turn correctly around the board. A normal arrow or line will spin from its center, not from the end without the arrowhead. If you duplicate the arrow and put them end-to-end, they will spin where they meet.



A print spinner only has one arrowhead. How do you get it to spin where it should?

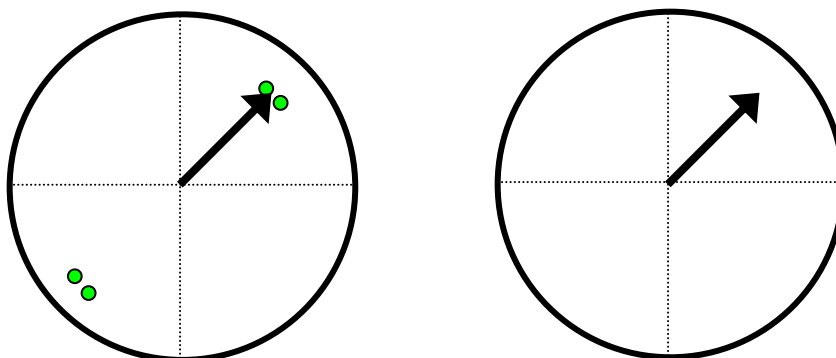
1. Draw an arrow and change the size and style of arrowhead to match the one below.
2. Duplicate it.
3. **Rotate or Flip** the copy **Horizontally** and move it so that the plain ends meet exactly.



This manual shows the second arrow dotted so that you can see what's happening. The gray arrow should be **No Line**. It will also show the correct spinner.



4. Change the second arrow's color to **No Line** using the **Line Color** icon on the **Draw toolbar**. It will still be selected, so hold down your **Shift** key and click the black arrow.
5. Group the arrows by clicking on **Draw / Group**. Notice the small squares border the "invisible" half too.
6. Center the arrow onto the spinner board. Where the inner lines meet is the center of the circle.
7. Click on the black arrow. Click on **Draw / Rotate / Free Rotate**. Green circles will appear on the arrow's length. Turn the arrow to the correct position.
8. Group and copy the spinner board and spinner arrow. Copy and paste it into another file in case you need another spinner in the future. **SAVE BOTH!** Just ungroup to rotate the spinner.



ANALOG CLOCKS INFORMATION

Depending on the student's grade and skill, you can put either 1, 2, or 4 clocks on a braille page. Just to start, use a single larger clock so that the parts are easier to find.

If showing 2 clocks, draw them one under the other. 4 clocks are shown 2 x 2.

Do not use the number sign on clocks.

The outside circle of the clock face should be a different line than the tick marks for the hours.

Do not show the minute tick marks unless needed to answer questions. If needed, the clock has to be larger to differentiate between the tick marks.

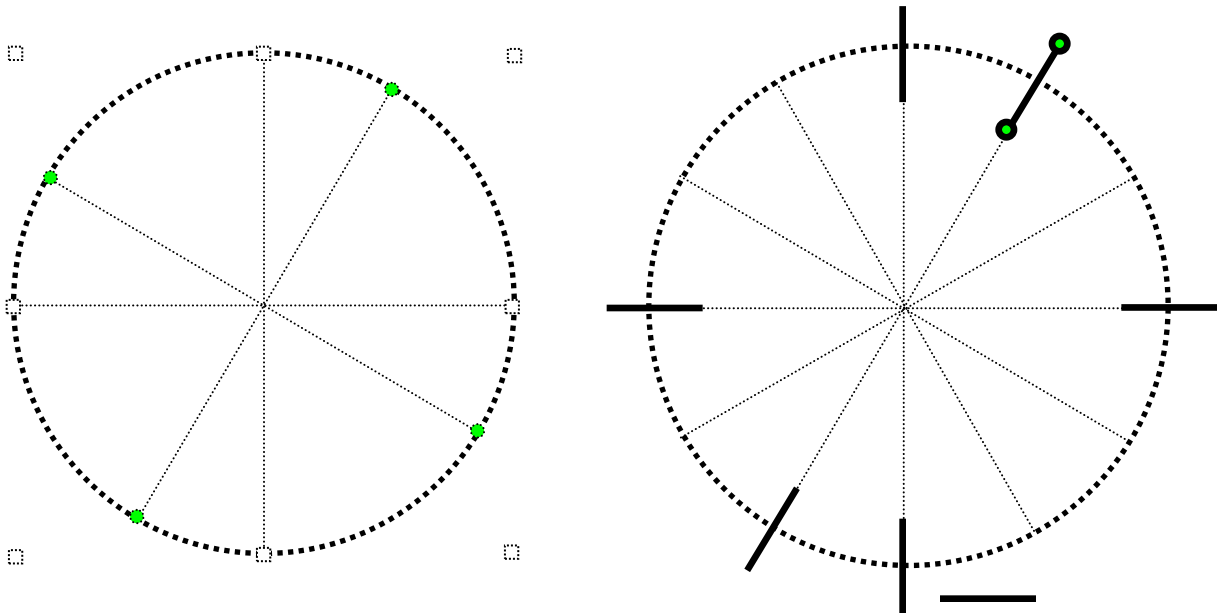
Tick marks straddle the circumference of the clock no less than $\frac{3}{16}$ " and no more than $\frac{1}{4}$ " on either side of the circle.

The numbers go on the outside of the circle about $\frac{1}{8}$ " away from the tick marks.

The hour hand and the minute hand should be different texture and length. The hour hand should be dotted or dashed and have an arrowhead. The minute hand should be a smooth line.

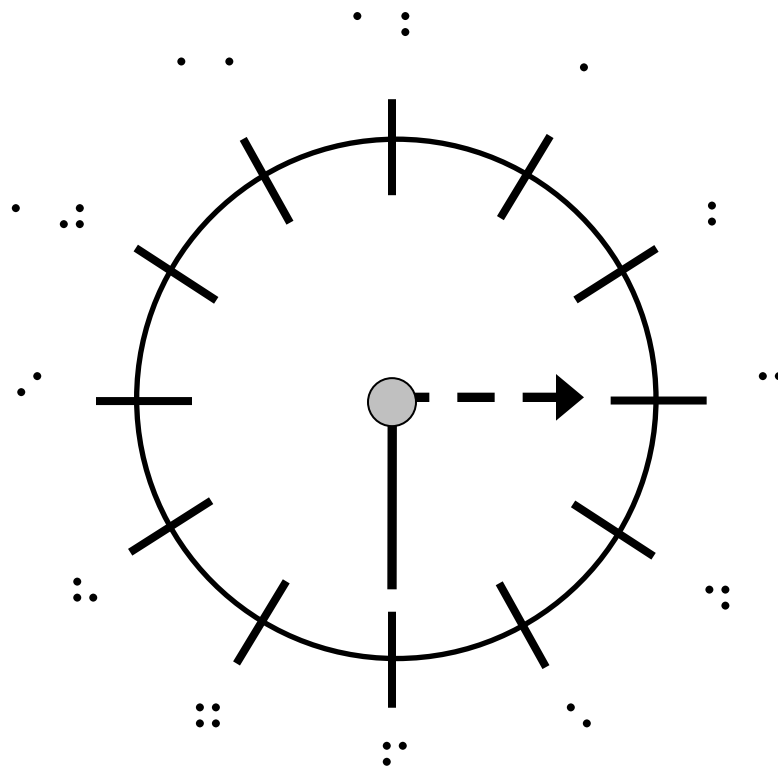
DRAWING CLOCKS

1. Draw a dotted circle about 4" in diameter. (The ones below are smaller so they fit.) Use **2 pt** size.
2. Draw a thin dotted line from the top to the bottom small square. Now draw another dotted line from the left to the right small square. Group the two dotted lines.
3. Duplicate the dotted lines. Match the copy over the top of the first line and while it is still selected, click on **Draw / Rotate or Flip / Free Rotate** and rotate the second group of dotted lines about 1/3 way around the axis so that it looks like the circle below on the left.
4. Repeat the steps so that the dotted lines look like the circle below on the right.



5. Draw a **1/2"** long tick mark **2.5 pt** over each line across the circumference of the circle. Draw the 3, 6, 9, and 12 o'clock tick marks first.
6. Duplicate the 6:00 tick mark. Click on **Draw / Rotate or Flip / Free Rotate**. Rotate the copy to fit properly over either the 7:00 or 5:00 line. Do the opposite tick mark by duplicating and moving. Repeat until all the tick marks are in place. Select the tick marks using the **Shift** key and click method and group just them without the rest of the clock. **SAVE!**
7. Remove the inner dotted lines. Select everything using the **Select Object** method and **Group**. **SAVE.**

8. You will need to use text boxes to add the numbers to the outside of the clock. Remember that you do not use the number sign on clocks.
9. Use the **Shift** key and click method to select and **Group** the numbers together.
10. Use the **Select Objects** method to select and **Group** the numbers and clock face together.
11. Add a light gray .25" circle to the middle of the clock face.



12. You build the clock hands like you did the spinner arrow. Each one is grouped separately so that they may be rotated individually.
13. The hour hand should be dotted or dashed with an arrowhead. Draw an 1" long arrow with a dashed or dotted shaft. Use the **larger arrowhead** (bottom center choice) and **3.5 pt.** Duplicate it. Change the copy to **No Line** and **Group** it with the other arrow. Move it so that it is facing 3:00.

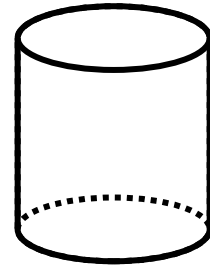
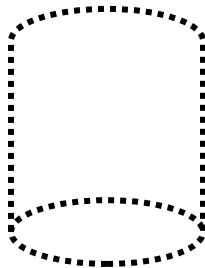
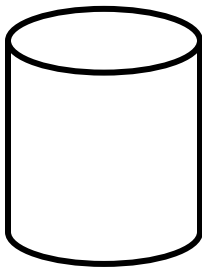


14. The minute hand should be smooth with no arrowhead. Draw a **1"** line at **3.5 pt.** Duplicate it. Change the copy to **No Line** and **Group** it with the other line. **Rotate** it so that it is pointing to 6:00.

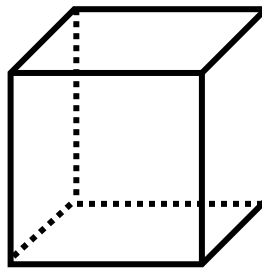
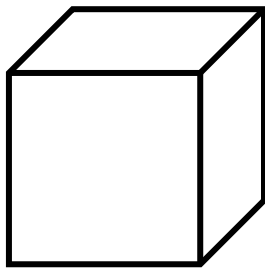


15. Click on the little gray circle in the middle of the clock face. Click on **Draw / Order / Bring to Front** so that the circle is over the lines.
16. Click on the smooth minute hand. Click on **Draw / Rotate or Flip / Free Rotate** and carefully rotate the minute hand around to where you want.
17. Click on the dashed or dotted hour hand. Click on **Draw / Rotate or Flip / Free Rotate** and carefully rotate the hour hand around to where you want.
18. **SAVE!** Now **SAVE AS** under a different filename such as ClockFace4inch. Whenever you need another clock of that size, open that file and copy and paste it into the file where a clock is needed.

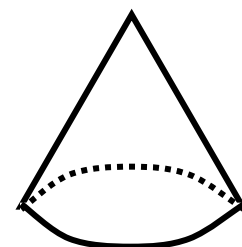
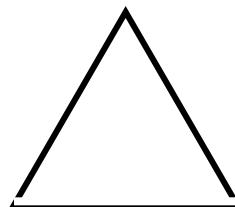
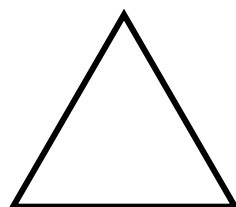
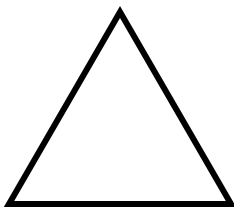
SHOWING INSIDE LINES OF 3-D SHAPES



AutoShape Duplicate Cylinder Overlap
Cylinder Flipped Vertically Group
 Change to 2.25 pt Change to Dotted **SAVE**



Cube Duplicate Cube
 Draw Lines from corners to meet.
 Change to Dotted Lines
 Group Dotted Lines, then Cube and Lines



Triangle

Draw white line
 same length as
 triangle but 2.25-
 3 pt wide.

Same White Line
 Moved Up to
 Hide Black Line

Draw curved line.
 Duplicate it.
 Change to dotted &
 flip.
 Move lines up.
 Group. Now **cone**.

REUSE GRAPHICS IN THIS FILE

You should get a CD with this handout. The CD will hold both the Word and PDF versions of this workshop, both Parts I and II. Part I contains information and instructions about computer graphics.

The CD also contains extra basic graphics that are available for use any time you want.

Please reuse any of the graphics you find in the Word file on the CD that came with this handout or any of the other graphics on your CD. Open your Word file and select the graphic. Use **Ctrl c** to copy it and **Ctrl v** to paste it into your new file (or **Edit / Copy** or **Paste**).

THE END